



N7516611

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## SIX DEGREE OF FREEDOM FORTRAN PROGRAM, ASTP DOCKING DYNAMICS, USERS GUIDE

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ROCKWELL INTERNATIONAL CORP., DOWNEY,  
CALIF. SPACE DIV

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SIX DEGREE OF FREEDOM FORTRAN PROGRAM  
"ASTP DOCKING DYNAMICS"  
USERS GUIDE

JUNE 1974

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## ABSTRACT

Documentation of the digital program "ASTP Docking Dynamics" is intended to aid the engineer using the program to determine the docking system loads and attendant vehicular motion resulting from docking two vehicles that have an androgynous, six-hydraulic-attenuator, guide ring, docking interface similar to that designed for the Apollo/Soyuz Test Project (ASTP). In its present form, the program is set up to analyze two different vehicle combinations: (1) the Apollo CSM docking to the Soyuz and (2) the Shuttle orbiter docking to another orbiter. The subroutine "RCS" modifies the vehicle control systems to describe one or the other vehicle combinations; the rest of the vehicle characteristics are changed by input data.

To date, the program has been used to predict and correlate ASTP docking loads and performance with docking test program results from dynamic testing conducted at NASA JSC in Houston. The program was written by Mr. John A. Schliesing, of NASA JSC, and modified for use on IBM 360 computers. Parts of the original docking system equations in the areas of hydraulic damping and capture latches were modified so that they may better describe the detail design of the ASTP docking system.





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## INTRODUCTION

This user's guide documents the "ASTP Docking Dynamics" Fortran-H computer program. The program computes docking system loads, vehicle loads, kinematics of the particular docking system design used in the Apollo/Soyuz test project, and motion of docking vehicles in response to docking loads and vehicle control system activity from the point of initial docking contact through capture latch activation and eventual draw down. The program does not include hard structural latching or hard docking dynamics.

The program treats the two vehicles and docking ring as rigid bodies each with six degrees of freedom and a structurally compliant and hydraulically attenuated docking interface between the ring and the active vehicle. The program output is in real time print and optional time history plots of loads and motion of the docking system and both vehicles.

The basic program was written for UNIVAC by NASA and modified by J. Rolley, L. Fesler, and B. Mikhalkin to be compatible with IBM O/S 360 Model 85 computing equipment at the Space Division of Rockwell International.





## PROGRAM DESCRIPTION

The "ASTP Docking Dynamics" program is recorded on nine-track magnetic tape and is available from the Rockwell Space Division computer library by calling for the mounting of tape UH9552 in the JCL cards. The program listing, source decks, and object decks are retained in Department 214, Group 420, for possible future modification and as a backup for the library tapes. The last two sections of this document contain program flow diagrams and locations of primary functions to aid the engineer in troubleshooting or finding where modifications to equations may be made.

## DOCKING SYSTEM

The docking system described mathematically in the "ASTP Docking Dynamics" program is presented in Figure 1. The passive or target vehicle docking system is presented in Figure 2. The docking mechanism concept is a tunnel with peripheral shock absorbers connecting an androgynous floating interface. The androgynous feature of the docking interface is provided by a symmetrical distribution of guides and capture latches on the active vehicle guide ring. During docking they are meshed with the reverse symmetry guides on the passive vehicle guide ring. The guide ring of the active docking system is extended from the structural base ring on six hydraulic attenuators in preparation for docking. The passive system guide ring remains retracted. Extension is by springs inside the attenuators. Initial contact is made between guides and guide rings. Miss distance and angular misalignments are indexed into alignment by the guides. Once the guide rings are coincident, the active system capture latches engage the passive vehicle's body-mounted latches for initial mechanical connection of the two docking vehicles. Attenuator hydraulic damping and extend springs control the relative motion of the two vehicles. Once the vehicles are stabilized, the active system cable retract mechanism is activated, and the two vehicles are drawn together until the structural base rings and docking tunnel seals engage. Structural ring latches are then actuated to provide a rigid structural interface between the now hard-docked vehicles.

The "ASTP Docking Dynamics" digital program can duplicate all the operations for docking except tunnel sealing and structural ring latch.

Presented in Figure 3 are the coordinate systems and vector directions used to describe the docking systems relationship with respect to each vehicle and the inertial frame. Each vehicle and the active docking system guide ring are represented as bodies with point mass. The order of rotation to resolve one body's axes system into another is shown on Figure 4.

## VEHICLE GEOMETRY

To date, two different vehicle combinations have been simulated for docking loads and dynamic analysis. Figure 5 shows the vehicle geometry of

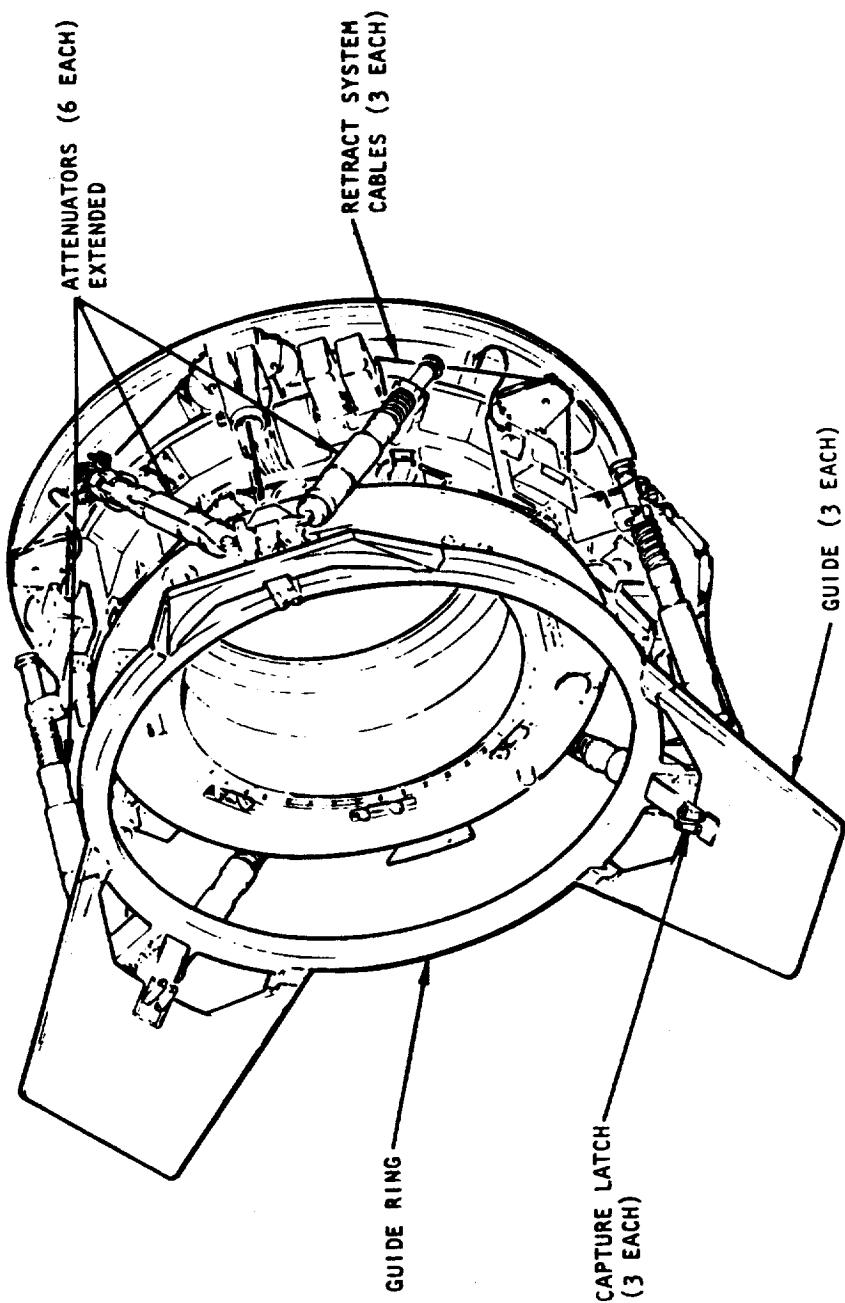


Figure 1. Active Vehicle, Active Docking System

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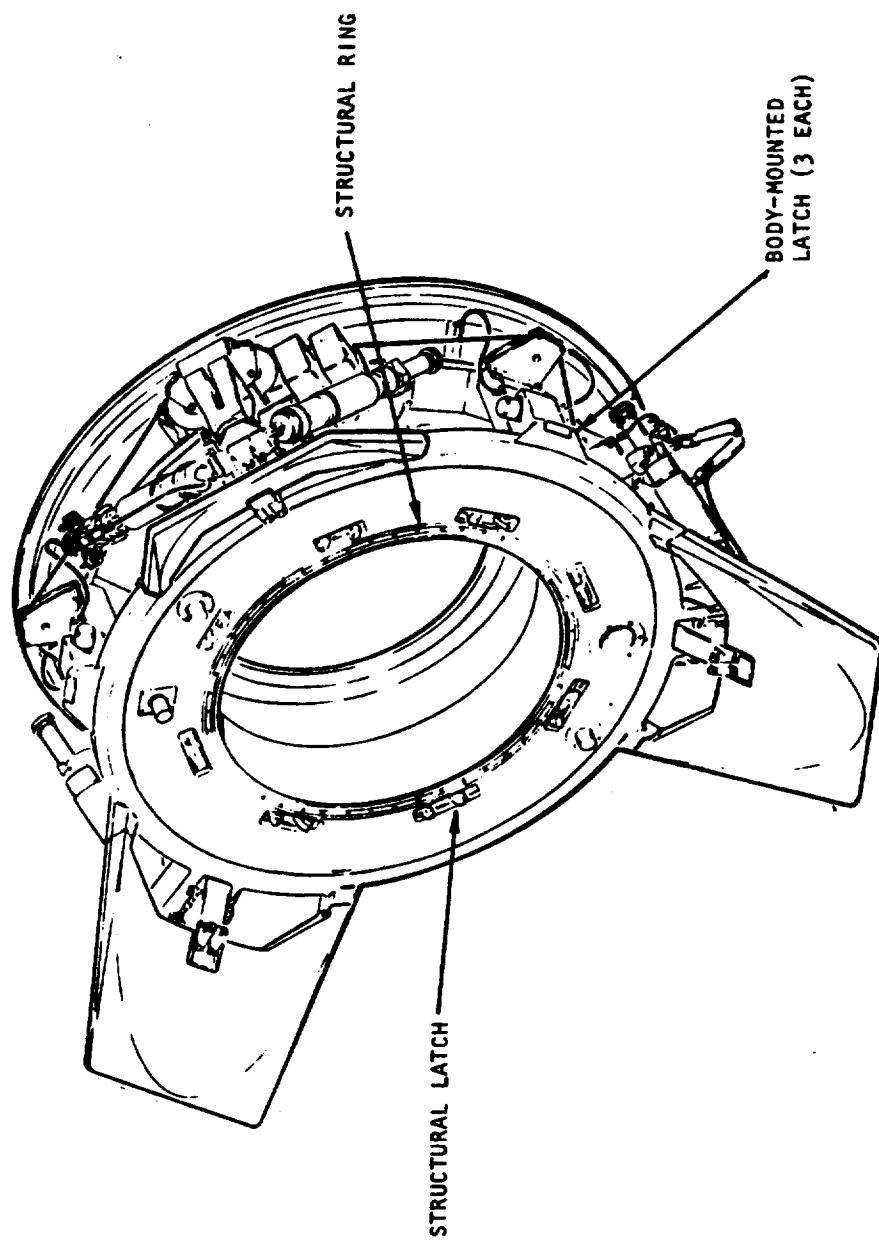


Figure 2. Target Vehicle, Passive Docking System

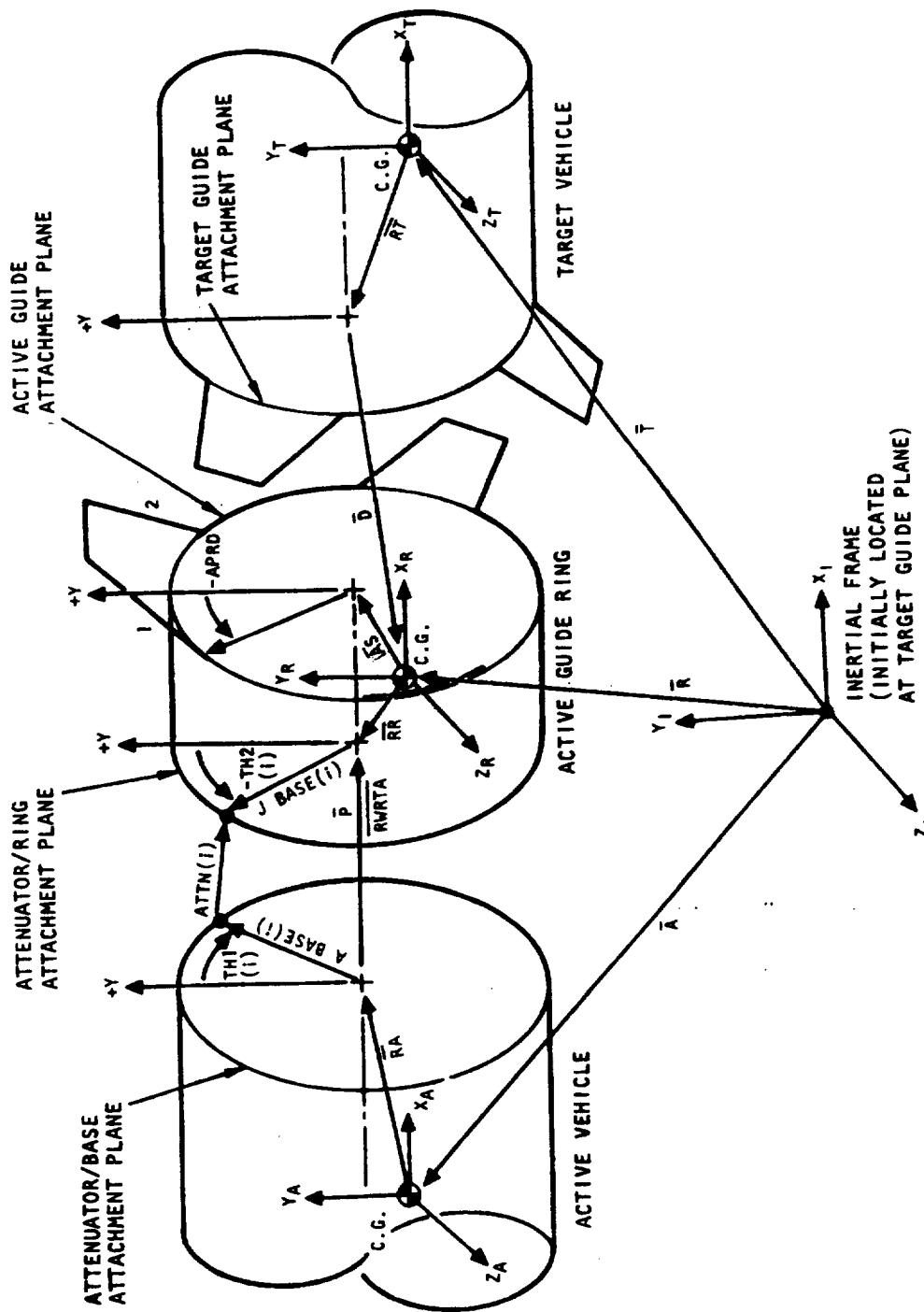


Figure 3. Docking Math Model Coordinate Systems

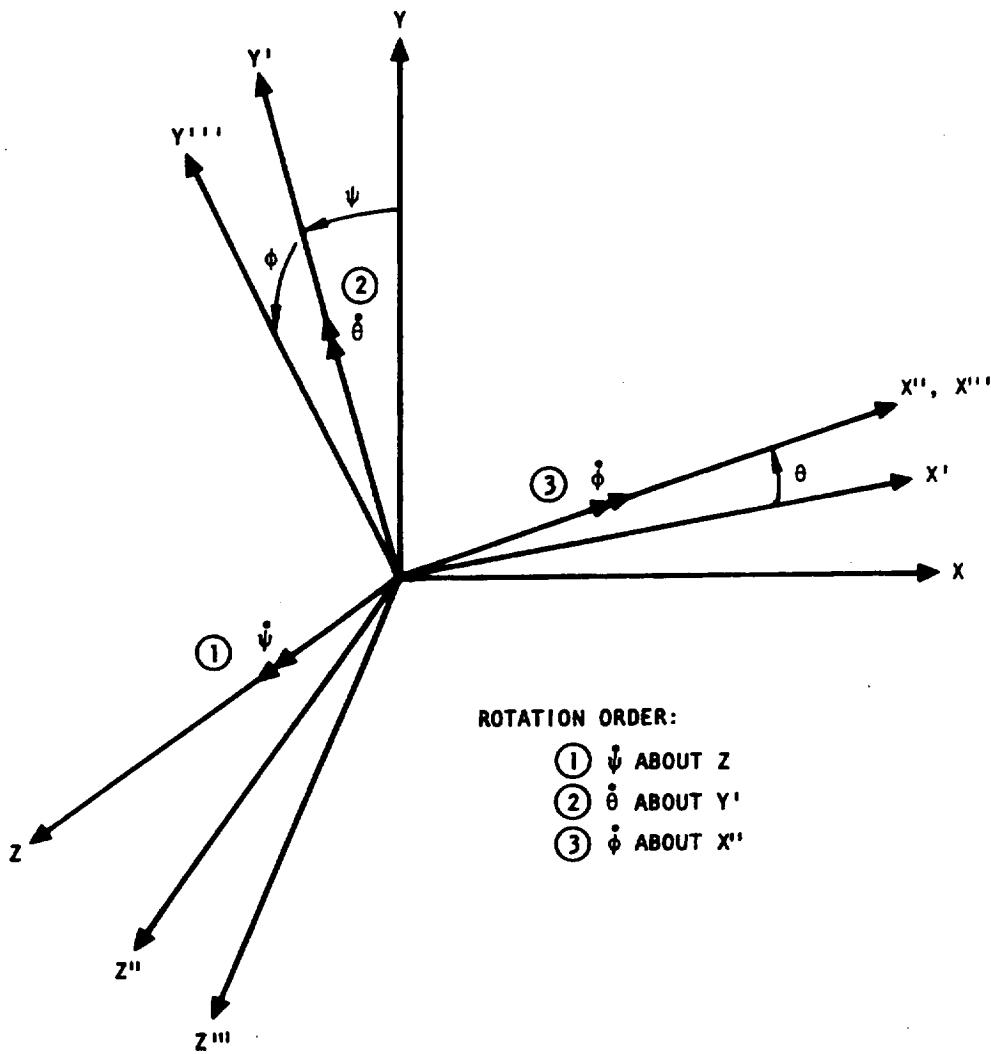


Figure 4. Euler Angle Rotations

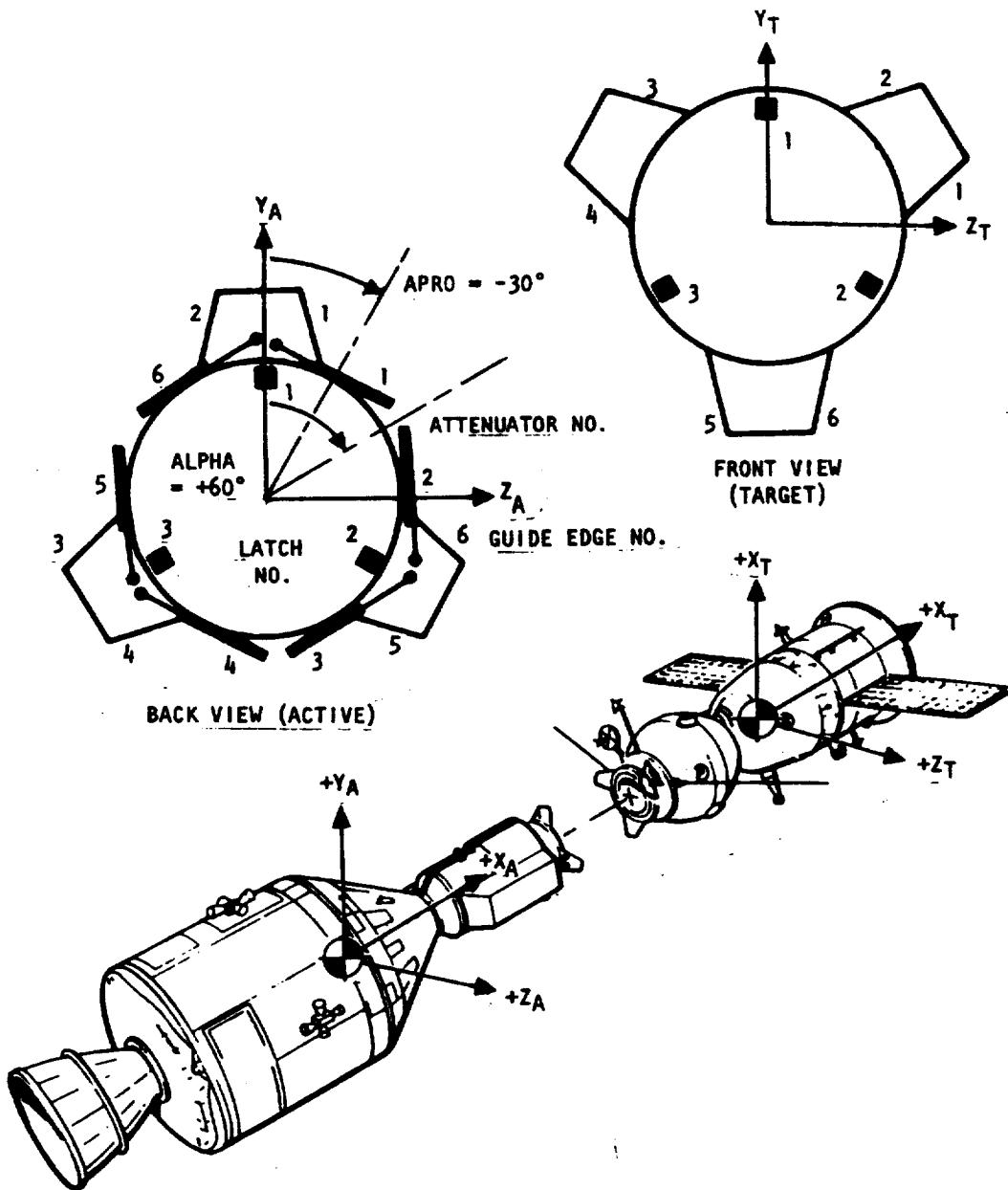


Figure 5. Apollo CSM/Soyuz Docking Model



the Apollo CSM docking with the Russian Soyuz spacecraft. Figure 6 shows the Shuttle orbiter docking with another orbiter. In each instance, the docking system is parallel with the X axis as required by the math model. This requires the user to rotate mass properties of the vehicles to the axis system used by the math model. Notice that the guide location with respect to the +Y axis in each instance is different depending on the values assigned to the geometry input APRO and ALPHA.

#### VEHICLE CONTROL SYSTEMS

The "ASTP Docking Dynamics" program includes reaction jet control systems for three different vehicles: The Apollo CSM, the Soyuz spacecraft, and the orbiter. All three are basically attitude and rate-feedback control systems that activate specific combinations of reaction jets which generate pitch, yaw, and roll moments. These moments counteract any external forces, like docking, in an attempt at maintaining a particular inertial attitude.

In addition to attitude hold, the control system may be commanded to provide closing thrust of translation jets oriented parallel to the X axis of each vehicle. Closing thrust is cued by time after contact and terminated at some specified time after capture latch engagement of the docking system.

The attitude-hold control system of either vehicle can be switched to the "rate damping only" mode or into the "free" (no control) mode at some specified time after docking capture latch engagement.

The attitude-hold control system is of the general form shown in Figure 7 and is common to all three axes of rotation on all three vehicles. Figures 8, 9, and 10 present the reaction control jet configuration activated by the control systems for the CSM, the Soyuz, and the orbiter.

At present, the control systems are defined in subroutine "RCS." However, there are two models of this subroutine. One describes the CSM and Soyuz, and the other defines orbiter-to-orbiter control system configurations. A modification to the program is being planned to include both RCS subroutines with a call symbol to define which one is desired.

#### EQUATIONS OF MOTION

Time-dependent equations of motion, oriented with respect to a body-axis system in an inertial frame (nonprincipal) for three bodies, i.e. active vehicle, docking ring, and passive vehicle, are from the classic Newtonian mechanics found in any good dynamics text or in engineering handbooks such as "Marks' Mechanical Engineers Handbook." The generalized equations are of the position, velocity and acceleration form as follows:

$$\begin{aligned} r_o &= r_q + r \\ v_o &= v_q + r_w + v \\ a_o &= a_q + r(\omega + \dot{\omega}^2) + 2V\omega + a \end{aligned}$$

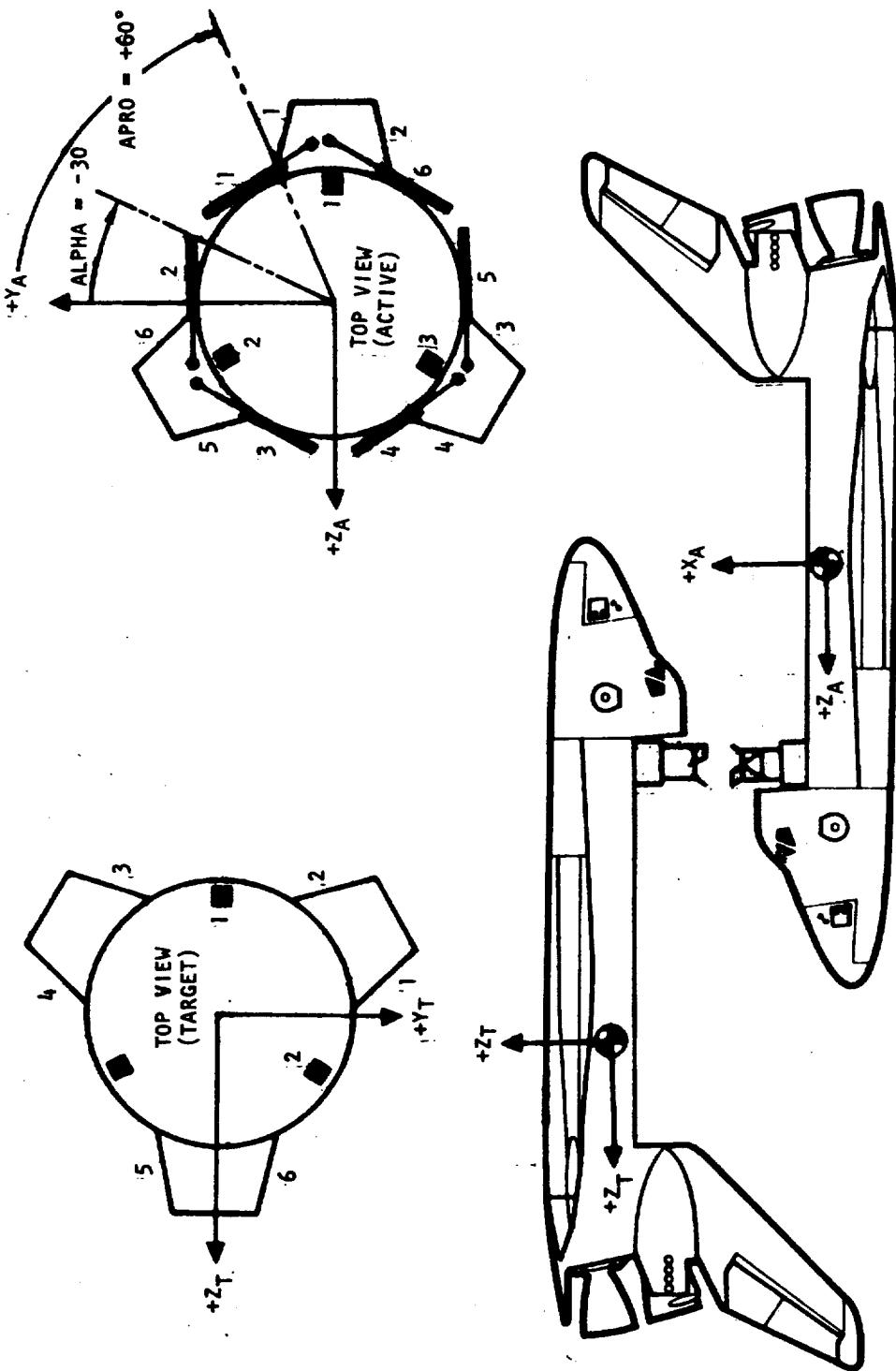


Figure 6. Shuttle Orbiter/Orbiter Docking Model

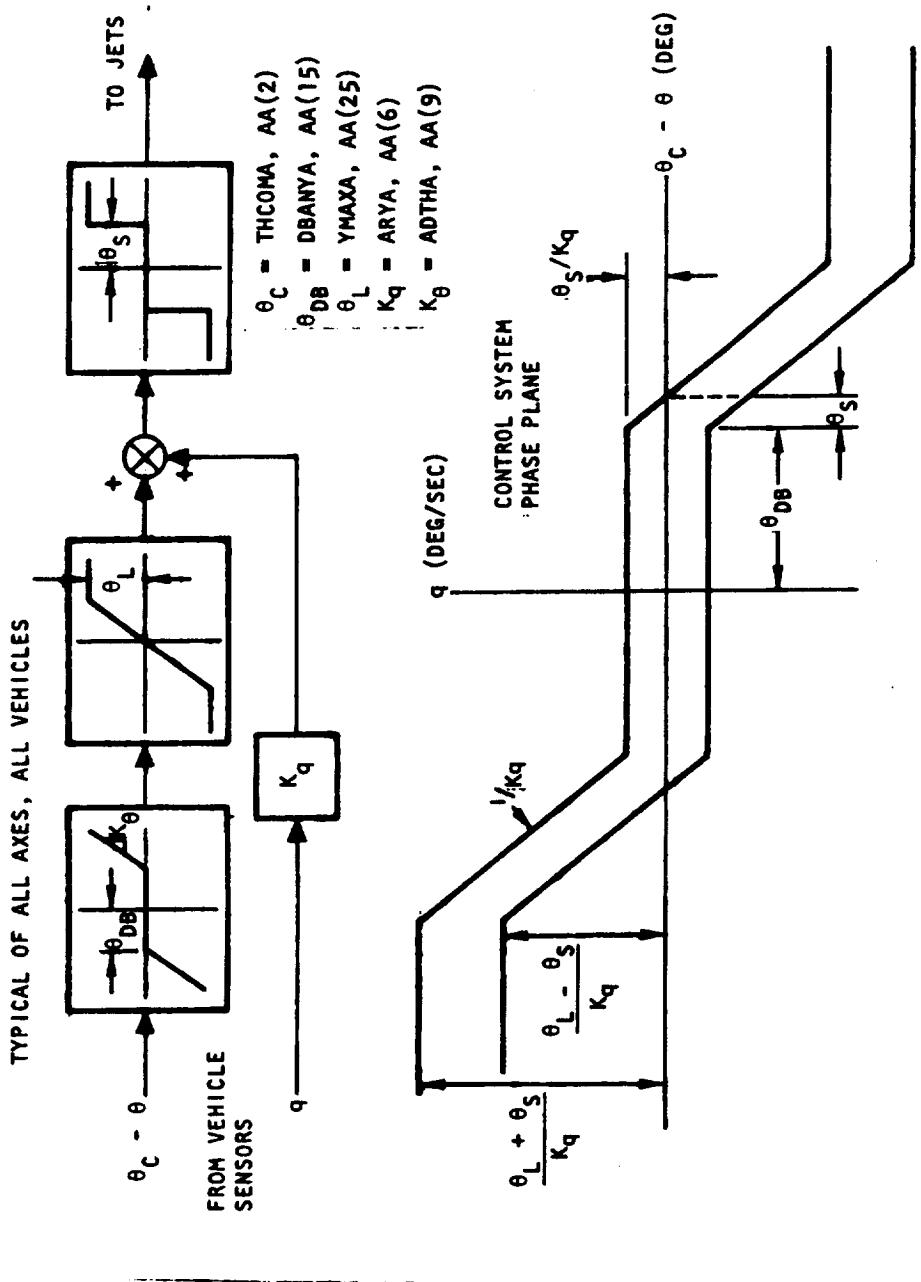


Figure 7. Attitude Hold Control System Characteristics

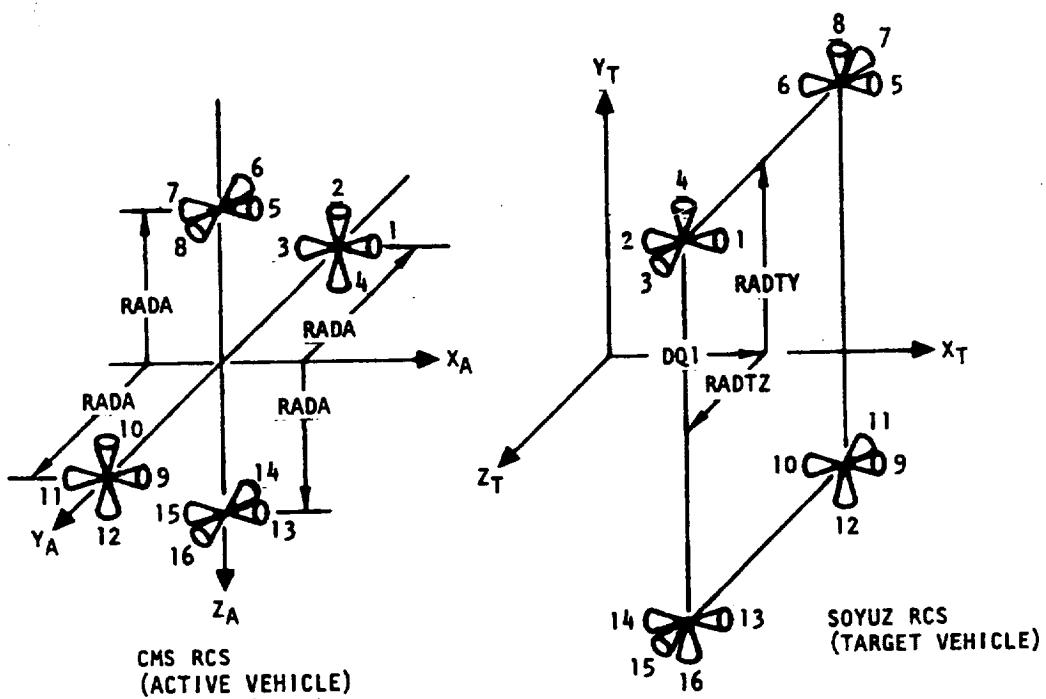


Figure 8. Reaction Control System Geometry

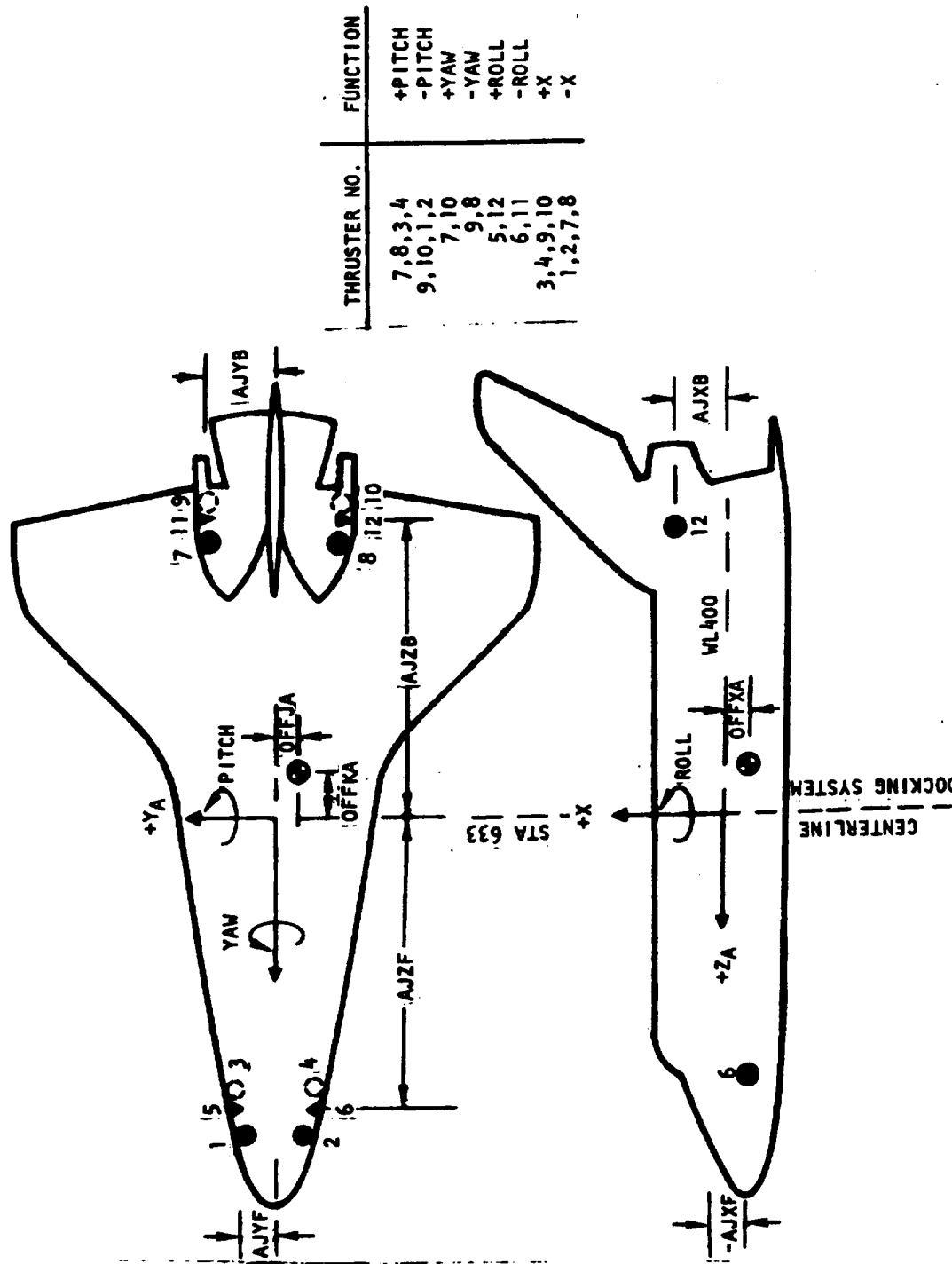


Figure 9. Orbiter Reaction Control System Geometry, Active Vehicle

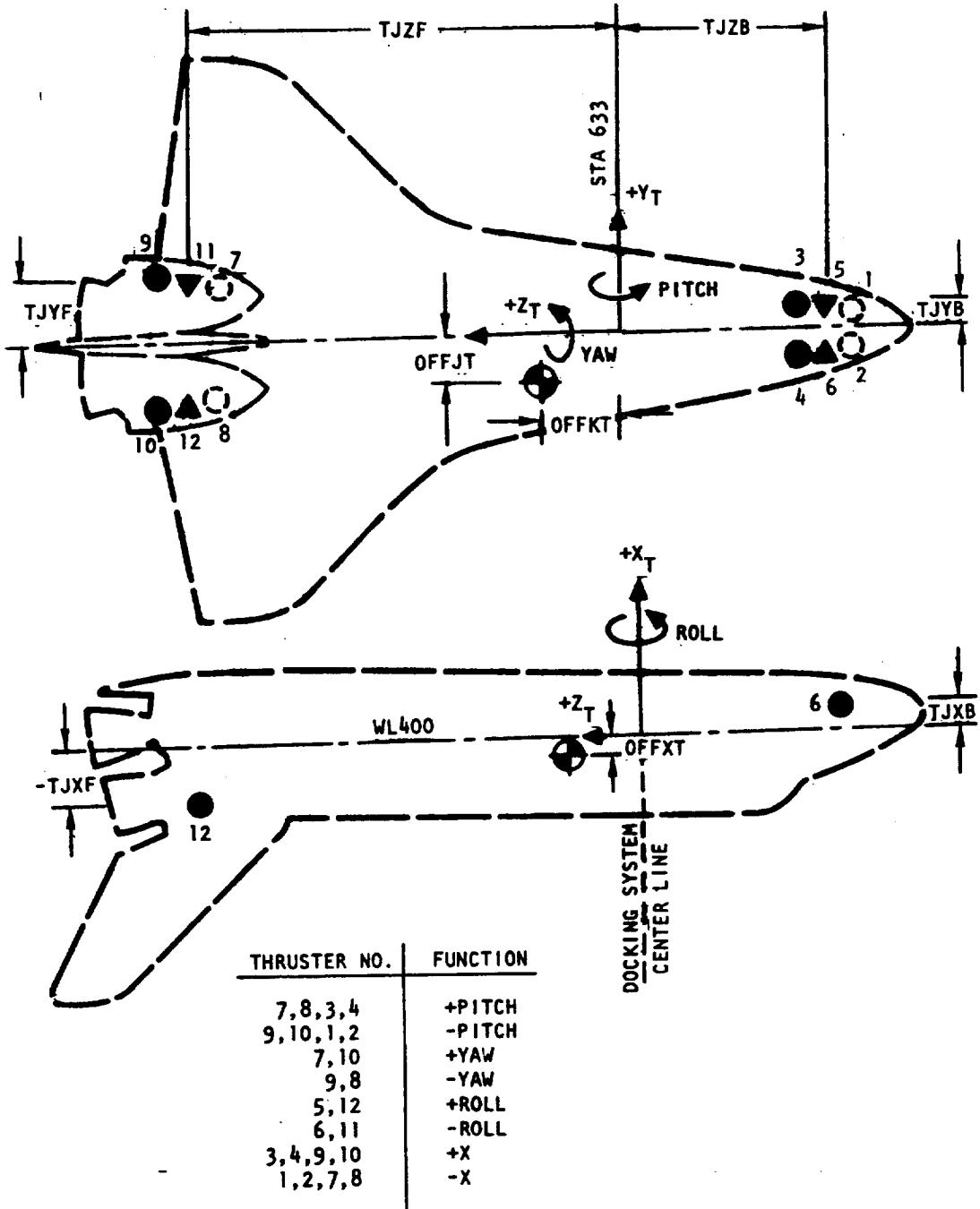


Figure 10. Orbiter Reaction Control System Geometry, Target Vehicle



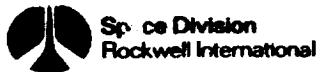
The foregoing equations were expanded into the X, Y, Z axes by John A. Schliesing of NASA for the docking dynamics mathematical model. Interdependent sets of the six basic force and moment equations were developed for each of the three bodies relative to its own center of gravity, but referenced to the coordinate system of the target vehicle. To facilitate relative values between the bodies. The equations are:

$$\begin{array}{ll} \Sigma F_x - M_{a_x} = 0 & \Sigma M_x - I_x \dot{\theta} = 0 \\ \Sigma F_y - M_{a_y} = 0 & \Sigma M_y - I_y \dot{\theta} = 0 \\ \Sigma F_z - M_{a_z} = 0 & \Sigma M_z - I_z \dot{\psi} = 0 \end{array}$$

The locations of the foregoing equations are identified by subroutine in the last section of this guide.

#### PROGRAM LIMITATIONS

1. The docking program starts itself by positioning the two vehicle centers of gravity with the proper miss distance and angular mis-alignments at the interface, but with a relatively large axial distance between the docking interfaces. It then iterates by incrementally reducing the axial separation until contact occurs between the docking system guides or guide rings. Once the contact point is established, the vehicles are mathematically released to continue dynamics at the input relative velocities and angular rates. If the geometries of the guides and guide rings are not compatible with the input miss distance and angular misalignment, i.e., a guide misses the oncoming guide ring, the program will continue operating until some computation sees a metal-to-metal penetration that results in a step load of millions of pounds or until a sine/cosine function tries to take the square root of a negative number. An abnormal termination of the run will result.
2. Some of the input values cannot be zero without causing the program to terminate on divide check errors. It is suggested that a small positive number be used instead of zero; otherwise, a search through the listing is in order to determine the effect of the zero prior to a run.
3. There are no small angle approximations in the mathematical descriptions.
4. The program is written on a "flat" earth basis; i.e., orbital mechanics have not been included.
5. There are three time stops in the program that limit run time. The first stop permits a specified run time during which capture must be accomplished; otherwise the program will terminate. The second time stop specifies the duration of post-capture dynamics. The



third time stop is determined by the CPU time specified in the JCL cards. It is recommended that all three input time stops be utilized to prevent waste of auto comp time, print, and plotted data.

6. Since the integration package uses the same integration interval for all three body masses, the smallest mass will determine the size of integration interval that can be used. The larger the interval, the less the auto comp time required, until the interval becomes large enough to cause numerical instability in the dynamics of the smallest mass of the three bodies. At present, some investigation is required to optimize the integration interval to use with a particular set of docking masses.
7. The print interval can be specified in the input data. Care should be exercised in selecting the print interval to prevent the generation of a massive amount of paper.



## INPUT DATA

The input data for the "ASTP Docking Dynamics" program are best displayed on the keypunch decimal data forms presented in this section. The data are arranged in lettered arrays in an attempt at maintaining a rationale order. As the program is modified, the order is sometimes violated. The following is the present order of input data as seen in the data forms:

Data Type	Array	Page
Vehicle mass properties	A & B	1
Attenuator locations, guide ring spring constant, hydraulics	C	2 & 3
Initial contact conditions	C & T	3 & 11
Retract mechanism	D	4 & 5
Plot and print controls	E	5
Integration controls	F	6
Active vehicle (CSM) control system	AA	6 & 7
Target vehicle (Soyuz) control system	AT	8 & 9
Orbiter control system	GBABY	7 & 8
Attenuator orifice areas	C8	10
Attenuator stroke at orifice areas	SS	10
Guide ring mass properties	ADD	11
Guide locations, latch spring constant	ADD	11 & 12
Attenuator tension spring	ADD	12 & 13
Attenuator return spring and stroke	ORD, ABB	13



<u>Data Type</u>	<u>Array</u>	<u>Page</u>
Attenuator tension or return orifice vs. stroke	C02,SS2	15
Retract motor torque vs. RPM	TQE, RPM	15 & 16
Run title		
Run configuration indicators	Integers	17

#### DEFINITION OF INPUT DATA NOMENCLATURE

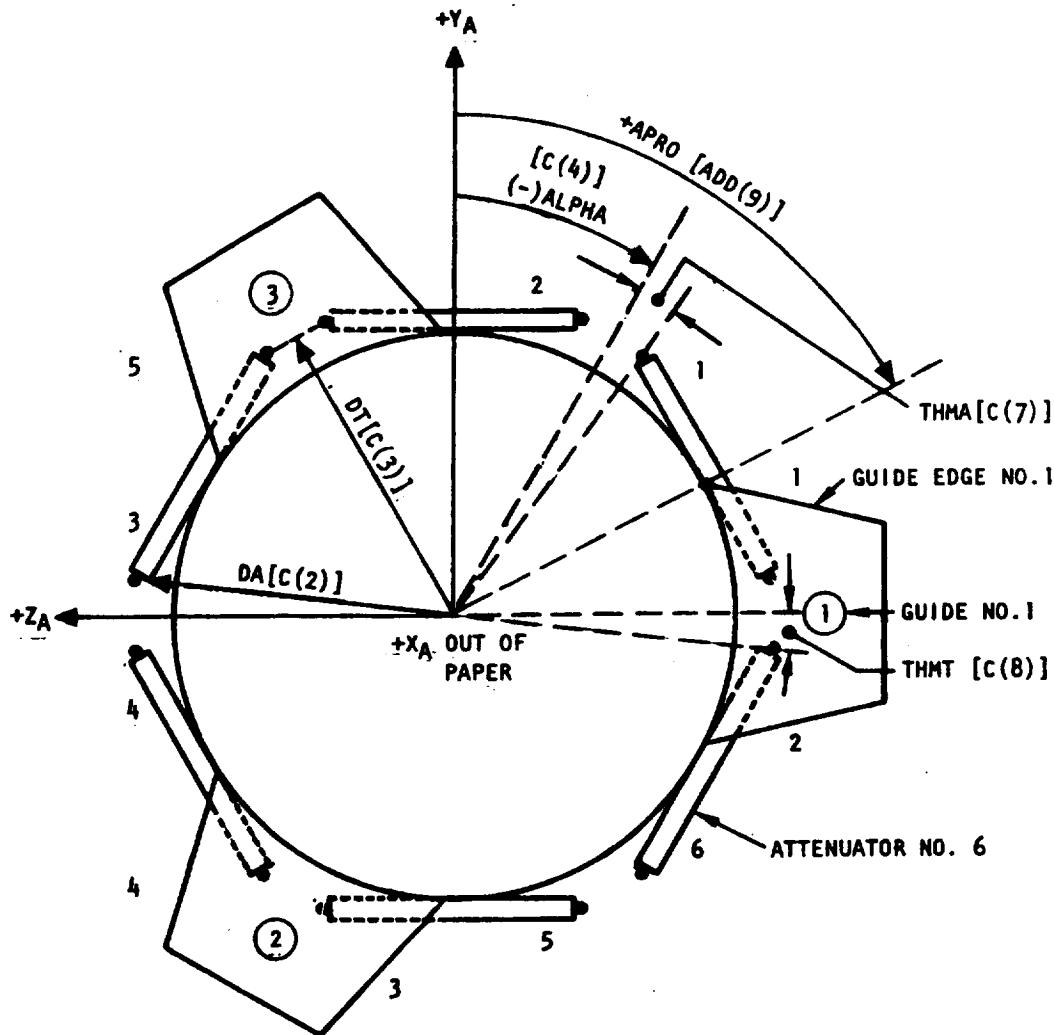
Input data nomenclature is listed and defined in the description column of the example decimal data forms. Additional explanation is required of some of the more complex input data as follows:

1. C(2) through C(8) locate attenuator connections to the base structure and the guide ring as shown in Figure 11. Angles are positive in the directions shown. The geometry of the guides on the target vehicle duplicate those on the active vehicle. The corresponding target guide edges are numbered as shown in Figure 12.
2. Figure 13 defines attenuator orifice areas and piston areas and presents a diagram of the attenuator.
3. Docking contact conditions (i.e., relative velocity and position combinations existing at initial docking contact) selected for maximum load analysis should satisfy the following general requirements:
  - a. Magnitudes should be within the design docking contact conditions listed in the specifications.
  - b. Combinations should be in a direction to maximize the energy of contact.
  - c. Conditions should exercise as many possible loading points and mechanism functions as practical.

The initial contact conditions are defined as follows:

The relative closing velocity is defined as +X velocity between the vehicle C.G.'s in the passive vehicle axis system.

The relative lateral velocity is defined as a combination of Y and Z velocities between the vehicle C.G.'s in the passive vehicle axis system.



**ALPHA, C(4)** - LOCATES THE ATTENUATOR ATTACH POINTS ON THE BASE STRUCTURE OF THE ACTIVE VEHICLE FOR ATTENUATORS NO. 1 AND 2 IN DEGREES. ATTENUATORS ARE NUMBERED COUNTERCLOCKWISE LOOKING IN THE -X DIRECTION.

**APRO, ADD(9)** - LOCATES GUIDE EDGE NO. 1 INTERSECT WITH THE GUIDE RING IN RADIAN. GUIDE EDGES ARE NUMBERED CLOCKWISE LOOKING IN THE -X DIRECTION.

Figure 11. Active Docking System Guide Edge and Attenuator Locations

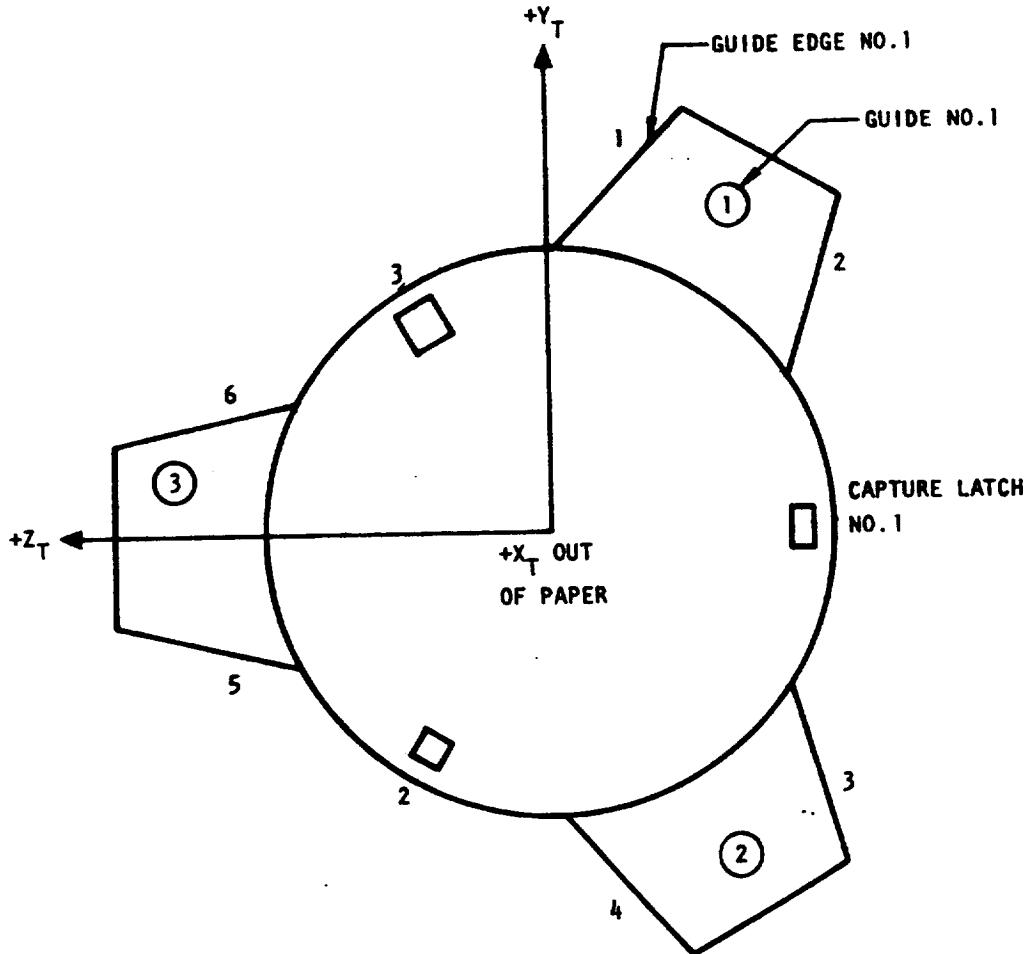
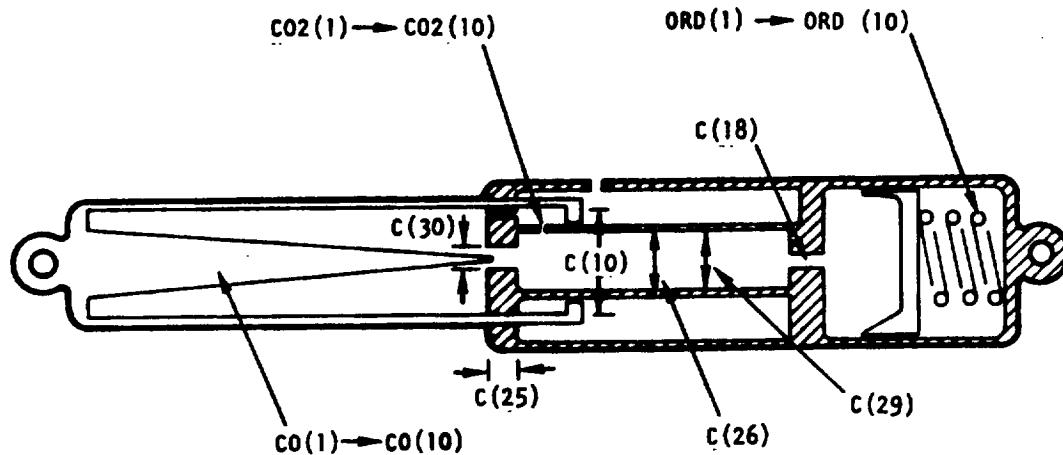


Figure 12. Target Docking System Guide Edge Location



- C(10)** ATTENUATOR RETURN CYLINDER AREA, AC FOR RETURN  
**C(11)** PUT IN A LARGE NUMBER, EQUATIONS NOT VALID FOR RETURN  
**C(18)** ACCUMULATOR ORIFICE AREA, SAPO  
**C(25)** METERING PIN ORIFICE LENGTH, DLGTH  
**C(26)** RETURN INNER CYLINDER AREA, B FOR RETURN  
**C(29)** ATTENUATOR COMPRESSION CYLINDER AREA, AC FOR COMPRESSION  
**C(30)** OPEN METERING PIN ORIFICE AREA, B FOR COMPRESSION  
**C0(1) → C0(10)** RESULTING ORIFICE AREA AS PIN MOVES  
**SS(1) → SS(10)** STROKE AT POINTS OF PIN ORIFICE AREA  
**C02(1) → C02(10)** RETURN ORIFICE AREA ARRAY  
**SS2(1) → SS2(10)** STROKE AT POINTS OF RETURN ORIFICE AREA  
**ORD(1) → ORD(10)** SPRING FORCE ARRAY  
**ABB(1) → ABB(10)** SPRING STROKE PER LOAD ARRAY

Figure 13. Attenuator Characteristics



The miss distance between vehicle docking systems is measured normal (Y and Z directions) to the passive vehicle X axis to a point defined by the centerline of a plane passing through the forwardmost part of the active docking system.

The relative angular velocity between the docking vehicles axes of rotation assumes the passive vehicle has no angular rate and the active vehicle is rotating about any of its axes. The direction of angular velocity will be chosen to amplify the lateral velocity at the docking interface to provide maximum loads and more difficult capture conditions.

The relative attitude between the docking vehicles axes of rotation assumes the passive vehicle is at zero inertial attitude and the active vehicle is misaligned for maximum loads and capture performance. The direction of the angular misalignment will be selected to align the active vehicle X axis as near as possible to the total C.G. relative velocity vector.

The following input data locations define the initial conditions at docking contact:

C(19) - THDRO - Angle about  $+X_T$  (right-hand rule) measured from  $+Y_T$  to the radial in which miss distance is to exist.

C(20) - XMISS - Lateral distance between docking system centerlines, miss distance, unfortunately named XMISS.

C(40) - THANG - Angle about  $+X_T$  (right-hand rule) measured from  $+Y_T$  to the plane of pitch/yaw misalignment.

C(41) - THTOT - Relative angular misalignment in the pitch/yaw misalignment plane.

C(42) - THVEL - Angle about  $+X_T$  (right-hand rule) measured from  $+Y_T$  to the radial in which lateral velocity is to exist.

C(43) - VL - Radial velocity, relative lateral velocity.

C(44) - OMEGR - Relative roll rate.

C(45) - OMEGT - Relative angular rate in the pitch/yaw plane.

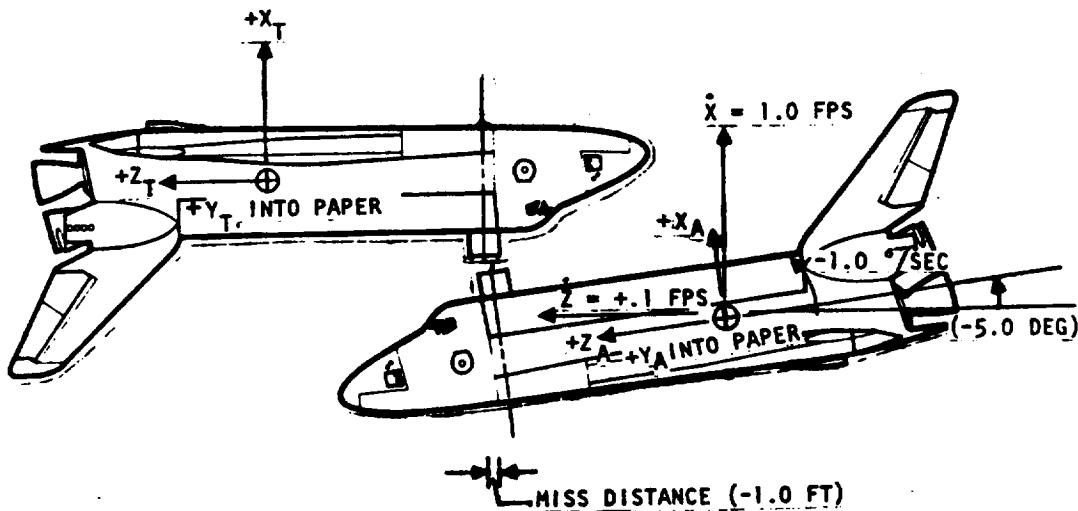
C(46) - THOMEL - Angle about  $+X_T$  (right-hand rule) measured from  $+Y_T$  to the pitch/yaw plane in which angular rate is to exist.

T(25) - XAD - Closing velocity in the  $+X_A$  direction.

The above input for initial conditions is demonstrated by the example shown in Figure 14.



<u>DESIRED CONDITION</u>		<u>REQUIRED INPUT</u>
$\dot{x}$	CLOSING VELOCITY = 1.0 FPS	$T(25) = 1.0$
$\dot{y}$	LATERAL VELOCITY = 0 FPS	$C(42) = 90. \quad C(43) = +0.1$
$\dot{z}$	LATERAL VELOCITY = +.1 DEG/SEC	
$\dot{\theta}_r$	PITCH RATE = -1.0 DEG/SEC	$C(46) = 90. \quad C(45) = -1.$
$\dot{\psi}_z$	ROLL RATE = 0 DEG/SEC	
$\dot{\phi}_x$	YAW RATE = 0 DEG/SEC	$C(44) = 0.0$
$\theta_r$	PITCH ANGLE = -5 DEG	$C(40) = 90. \quad C(41) = -5.$
$\psi_z$	ROLL ANGLE = 0 DEG	
$\phi_x$	YAW ANGLE = 0 DEG	$T(14) = 0.0$
$y$	MISS DISTANCE = 0 FT	
$z$	MISS DISTANCE = -1.0 FT	$C(19) = 90. \quad C(20) = -1.0$



THE DOCKING SYSTEM CENTER LINE MUST BE INPUT PARALLEL TO THE MATH MODEL X AXIS; I.E., MASS PROPERTIES NORMALLY PUBLISHED WITH X AXIS POINTING OUT THE FRONT OF THE VEHICLE MUST BE ROTATED TO PARALLEL THE DOCKING SYSTEM.

Figure 14. Diagram of Initial Conditions



4. The maximum load search interval E(4) and case number I(5) provide punched card data at time slices where maximum loads occur on the target vehicle docking system. The cards are used in an ancillary program, written by Herb Reed in Department 215, to print out maximum loads data in the format used in ASTP documentation. The ancillary program has not yet been incorporated in the "ASTP Docking Dynamics" program.
5. The CRT plotting subroutine stores 1100 data points per parameter. If E(8)-DESLC is input too small, plotted data points will end before the run stops. If E(8) is input as >100 seconds, the program will automatically set the plot interval to spread the data points throughout the run time input in E(3) summed with ADD(74).
6. Both the active vehicle and target vehicle control systems can change control modes based on time prior to capture latch and time after latch engagement. AA(1) specifies a time after contact that closing thrust will be applied to the active vehicle. AA(18) specifies how long after capture latch closing thrust will terminate. AA(17) set equal to -1.0 will cause the active vehicle attitude rate gains to switch to the values in AA(19), AA(20), and AA(21), which, if set equal to zero, will simulate the "free" or "drift" mode. All other control system parameters are defined in the control system discussion.
7. The guide ring mass properties, guide location, and guide geometry are described by input data ADD(1) through ADD(18). All are self-explanatory except ADD(14) through ADD(17), which are clarified in Figure 15.
8. The capture latch is a roller that locks in bearing on a 45-degree surface of the target vehicle interface at the center of each guide. The spring constant of the latch and backup structure, as well as the resulting latch load, is oriented internal to the program at a 45-degree angle. The load direction on the roller is radially outward at the center of each active guide 45 degrees off the +X axis as shown in Figure 5.

#### SHUTTLE ORBITER DOCKING INPUT DATA

The following pages are a list of the loads analysis, computer input data. The input data describe the docking system characteristics, docking vehicle mass properties, and vehicle control system characteristics as used for orbiter docking to orbiter.

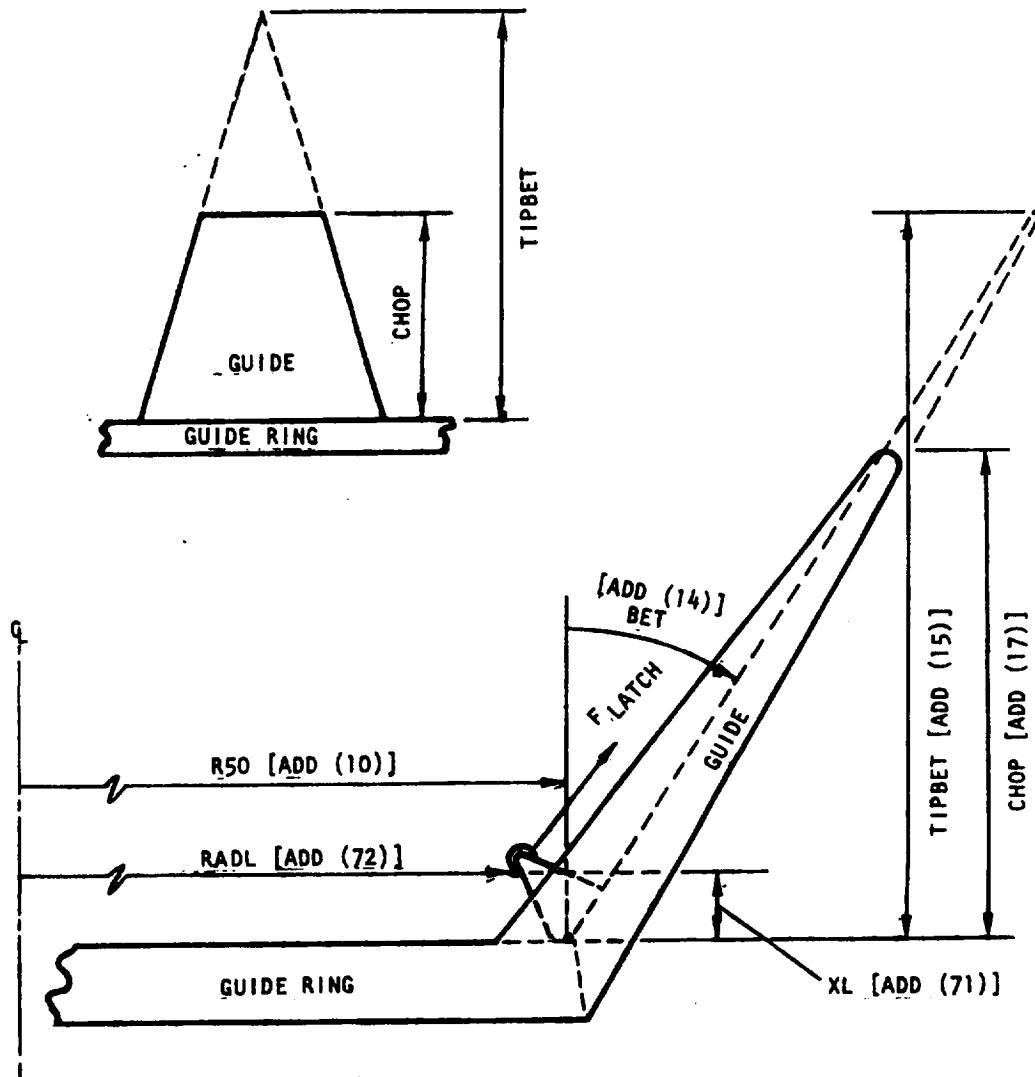


Figure 15. Guide Geometry

**FORTRAN FLOATING 8 DIGIT DECIMAL DATA**  
**ORBITER DOCKING SYSTEM MATH MODEL G.O. MANT**  
**DECK NO. \_\_\_\_\_ PROGRAMMER \_\_\_\_\_ DATE 5/2/74 PAGE 1 of 17 JOB NO. \_\_\_\_\_**

NUMBER	D	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH	UNITS
-	-	-	NAME LIST		
-	-	A(1) NOT USED			
-	-	ACTIVE VEHICLE			
-	-	MASS PROPERTIES A(2) MASS			SLUGS
-	-	A(3) IXX INERTIA	"	"	SLUG-FT <sup>2</sup>
-	-	A(4) IYY "	"	"	"
-	-	A(5) IZZ "	"	"	"
-	-	A(6) IXY "	"	"	"
-	-	A(7) IXY "	"	"	"
-	-	A(8) IYX "	"	"	"
-	-	A(9) Y-DIST, C.G. TO E	"	"	FT
-	-	A(10) Z-DIST,	"	"	"
-	-	A(11) X-DIST,	"	"	"
-	-	B(1) NOT USED			
-	-	TARGET VEHICLE			
-	-	B(2) MASS			
-	-	B(3) IXX INERTIA	"	"	SLUG-FT <sup>2</sup>
-	-	B(4) IYY "	"	"	"
-	-	B(5) IZZ "	"	"	"
-	-	B(6) IXY "	"	"	"
-	-	B(7) IXY "	"	"	"
-	-	B(8) IYX "	"	"	"
-	-	B(9) Y-DIST, C.G. TO E	"	"	FT
-	-	B(10) Z-DIST,	"	"	"
-	-	B(11) X-DIST,	"	"	"

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JOB NO.

PROGRAMMER

DECK NO.	D	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH	UNITS	
-0	-0	-0	C(1) NOT USED			
-1	+0.0	-9	C(2) DA, RADIUS TO ATTENUATOR @ BASE	FT		
-2	+2.39	-9	C(3) DT, RADIUS TO ATTENUATOR @ RING	"		
-3	+2.74	-9	C(4) ALPHA, ANGLE TO PT. BTW. ATT#1&2	DEGREES		
-4	-3.0.0	-9	C(5) RXT, =+1.0 EXTREME BOUND, =-1.0 INTERNAL	INCH		
-5	+1.0	-9	C(6) NOT USED			
-6	+0.0	-9	C(7) THMA, HALF AVERAGE BTW ATTACH & BASE	DEGREES		
-7	+3.0.0	-9	C(8) THMT, "	" @ RING	"	
-8	+6.5	-9	C(9) SKS, RING AXIAL SPRING CONSTANT	LBS/FT		
-9	+9.78.00.	-9	C(10) AC, RETURN CYLINDER AREA	IN <sup>2</sup>		
-10	+1.76.7	-9	C(11) AREA OF LARGE AREA	IN <sup>2</sup>		
-11	+1.0.00.	-9	C(12) NOT USED			
-12	+0.0	-9	C(13) "	"		
-13	+0.0	-9	C(14) "	"		
-14	+0.0	-9	C(15) "	"		
-15	+12.5	-9	C(16) FRICP, ATTENUATOR RUNNING FRICTION	LBS		
-16	+0.0	-9	C(17) NOT USED			
-17	+0.391	-9	C(18) SAPO, ACCUM. PISTON OFFICE AREA	IN <sup>2</sup>		
-18	+0.0	-9	INITIAL CONDITIONS			
-19	+1.0	-9	C(19) THDRO, ANGLE WRT Y-AXIS TO ARMED MASS	DEGREES		
-20	+0.0	-9	C(20) XMSS, MASS DISTANCE OUT RADIAL	FT		
-21	+0.0	-9	C(21) NOT USED			
-22	+1.0	-9	C(22) NOT USED	"		
-23	+0.0	-9	C(23) RSSX, X-DIST TO STRUCTURAL CHECK PLANE	"		
-24	+2.135	-9	C(24) RSSR, RADIUS TO STRUCTURE AT CHECK PLANE	"		

FORM 114-1 (1960)

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**FORTRAN**    **FLOATING**    **8**    **DIGIT DECIMAL DATA**

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DATE \_\_\_\_\_ PAGE 3 of 11 JOB NO. \_\_\_\_\_

PROGRAMMER

**DECK NO. \_\_\_\_\_**



**Space Division**  
**Rockwell International**

FORM 114-C-10 (SECOND)

## FORTRAN JUMPING &amp; DIGIT DECIMAL DATA

DATE PAGE 4 OF 17 JOB NO.

DECK NO.	PROGRAMMER	D	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH	UNITS
-		-	-	D(1) USED INTERNALLY		
-		-	-	D(2) "	"	
-		-	-	D(3) "	"	
-		-	-	D(4) NOT USED		
-		-	-	D(5) > 0.0 REINITIALIZES STANDARD DATA	N/D	
-		-	-	D(6) SPAN(1), CABLE LENGTH, MOVE TO ATTACH, FT		
-		-	-	D(7) SPAN(2), "	"	"
-		-	-	D(8) SPAN(3), "	"	"
-		-	-	D(9) SPAN(4), "	"	"
-		-	-	D(10) SPAN(5), "	"	"
-		-	-	D(11) SPAN(6), "	"	"
-		-	-	D(12) USED INTERNALLY		
-		-	-	D(13) "	"	
-		-	-	D(14) "	"	
-		-	-	D(15) OMIEGM, MOTOR RATE, = 00 UNLESS REMOVED RAD/SEC		
-		-	-	D(16) RPULL, CABLE DRUM RADIUS	FT	
-		-	-	D(17) X_B, DIST. FRM. ATTN. BASE TO ATTACH PT	"	
-		-	-	D(18) SKCAB, CABLE SPRUNG CONSTANT	LBS/FT/FT	
-		-	-	D(19) WAIT, RETRACT START TIME	SECONDS	
-		-	-	D(20) XC_R, DIST. FRM. END TO CABLE ATTACH	FT	
-		-	-	D(21) CRADD, RADIUS TO BASE CABLE PULLEYS	"	
-		-	-	D(22) CRADR, RADIUS TO RING CABLE ATTACH	"	
-		-	-	D(23) USED INTERNALLY	"	
-		-	-	D(24) EFF, RETRACT GEAR EFFICIENCY	N/D	
-		-	-			

FORM 114-C-1a 4" IND.





**FORTRAN**    **FLOATING**    **8**    **DIGIT**    **DECIMAL**    **DATA**

DATE                  PAGE 7 of 17 JOB NO.

REFERENCES



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FORTRAN FLOATING 8 DIGIT DECIMAL DATA

PROGRAMME I DATE PAGE 9 of 17 JOB NO.

DECK NO.	D	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH	UNITS
-	-	TARGET	AT(13) DBANYT, ATTITUDE DEADBAND, PITCH	DEGREES	
-	-	VEHICLE	AT(14) DBANZT, " " " , YAW	"	
-	-	CONTROL	AT(15) THCOMT, ATTITUDE COMMAND, PITCH	"	
-	-	SYSTEM	AT(16) PHNCOMT, " " , ROLL	"	
-	-		AT(17) PSCLMT, " " "	"	
-	-		AT(18) REACTT, TIME, Y-THRUST CUTOFF CAPTION	AFTER SECONDS	
-	-		AT(19) @AUXT, RATE GAIN AFTER CAPTION, ROLL DEF/SEC/SEC		
-	-		AT(20) BANVT, " " " "	PITCH	
-	-		AT(21) BANZT, " " " "	, YAW	
-	-		AT(22) DOL, C.G. TO X-JETS, SOURCE	FT	
-	-		AT(23) DOZ, " " Z " "	"	
-	-		AT(24) DO3, " " Y " "	"	
-	-		AT(25) TM1T, IF >0 HOLDS ATTITUDE CAPTION	NEVER	
-	-		AT(26) RMXT, ATTITUDE ERROR LIMIT, PITCH	DEGREES	
-	-		AT(27) YMXT, " " " , ROLL	"	
-	-		AT(28) PMXT, " " " , YAW	"	
-	-		AT(29) USED INTERNALLY		
-	-		AT(30) " "		
-	-		AT(31) " "		
-	-		AT(32) " "		
-	-		AT(33) " "		
-	-		AT(34) " "		
-	-		AT(35) " "		
-	-		AT(36) " "		
-	-		AT(37) " "		
-	-		AT(38) " "		
-	-		AT(39) " "		

FORM 114-G-16 (BOND)

## FORTRAN FLOATING 8 DIGIT DECIMAL DATA

DATE PAGE 10 of 17

PROG. NO. JOB NO.

DECK NO.	D	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH	UNITS
1		CQ(1)	ATTEN. 100% EXPANSION OFFICE AREA	"	IN <sup>2</sup>
2		CQ(2)	"	"	"
3		CQ(3)	"	"	"
4		CQ(4)	"	"	"
5		CQ(5)	"	"	"
6		CQ(6)	"	"	"
7		CQ(7)	"	"	"
8		CQ(8)	"	"	"
9		CQ(9)	"	"	"
10		CQ(10)	"	"	"
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**FORTRAN** FLoAtInG pArT 8 DiGiT DECImAl DATA

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Space Division  
Rockwell International

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## DIGIT DECIMAL DATA

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JOB NO.

PROGRAMMER

DECK NO.	D	IDENIFICATION	DESCRIPTION	DO NOT KEY PUNCH	UNITS
- + 0 . 0	-	RINGS CIRC	ADD(1) A225, Z-DIST. FRM RING CIR TO GUIDE PLATE	FT	
- + 0 . 9 0 7 5 7	-	LATCH DATA	ADD(14) BET, ANGLE FROM X-AXIS TO GUIDE FACE RADIAN	FT	
- + 4 . 1 2	-		ADD(15) TIP BET, AXIAL DIST. FROM RING TO GUIDE APPL	FT	
- + 0 . 0	-		ADD(16) TIP PRO, COMPUTED INTELLIGUALLY		
- + 1 . 1 6	-		ADD(17) CHOP, AXIAL DIST., CUT LENGTH OF GUIDE	FT	
- + 2 1 8 0 0 .	-		ADD(18) SPR, EQUIL. SPRING CONST. OF GUIDE & RING	LB/FT	
- + 1 0 * 0 . 0	-		ADD(19) THROUGH ADD(28) USED INTERNALLY		
- + 1 0 6 2 0 0 .	-		ADD(29) SKL, EQUAL SPRING CONST. OF GUIDE & LATCH	LB/FT	
- + 2 7 * 0 . 0 .	-		ADD(30) THROUGH ADD(56) USED INTERNALLY		
- + 1 . 5 0	-		ADD(57) XPO, SAME AS X P	FT	
- + 1 3 * 0 . 0	-		ADD(58) THROUGH ADD(70) NOT USED		
- + 0 . 3 2 5 .	-		ADD(71) XL, AXIAL DIST. FOR GUIDE INTERLOCK TO LATCH	FT	
- + 2 . 3 4 .	-		ADD(72) RADL, RADIUS TO LATCHES	FT	
- + 0 . 0	-		ADD(73) NOT USED		
- + 5 0 . 0	-		ADD(74) STOPL, STOP TIME AFTER TOTAL LATCH	SECONDS	
- + 0 . 0 0 7	-		ADD(75) HYSA, BURAJ HYSTERESIS, ACTIVE PEN.	"	
- + 0 . 0 0 7	-		ADD(76) HYST, " " TARGET "	"	
- + 4 * 0 . 0	-		ADD(77) THROUGH ADD(80) NOT USED		
- + 0 . 0	-		ATTACHMENT	ADD(81) ATTACHMENT TENSION SNUGGER FORCE THRORE	LB
- + 5 0 . 0	-		SPRING DATA	ADD(82)	"
- + 3 2 0 0 0 0 .	-		DATA	ADD(83)	"
- 7 * 0 . 0	-			ADD(84)	"
				ADD(85)	TOTAL OF 10 PTS
				ADD(86)	"

FORM 114-1-1 (MARCH 1968)

**FORTRAN**    **FLOATING**    **8**    **DIGIT**    **DECIMAL**    **DATA**

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PROGRAMMER

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PROGRAMMER



**Space Division**  
Rockwell International

FORM 114-C-16 (REV'D)

**FORTRAN FLUSTR 8 DIGIT DECIMAL DATA**

DECK NO. PROGRAMMER. DATE PAGE 15 of 17 JOB NO.  

NUMBER	D	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH	UNITS
- CΦ2 = + . 0 0 1 1		A T T E N U A T O R	CΦ2(1) ATTENUATOR, RETURN OFFICE, AREA		/IN <sup>2</sup>
- + 0 . 0 0 1 1	-	A T T E N U A T O R	CΦ2(2)	"	"
- + 0 . 0 0 1 1	-	A T T E N U A T O R	CΦ2(3)	"	"
- + 0 . 0 0 1 1	-	A T T E N U A T O R	CΦ2(4)	"	"
- + 0 . 0 0 1 1	-	A T T E N U A T O R	CΦ2(5)	"	"
- + 0 . 0 0 1 1	-	A T T E N U A T O R	(PΦ2(6)) TOTAL OF 10 PΦ2		"
- S52 = - 1 . 0	-		S52(1) ATTENUATOR, RETRIED OFFICE, SQUARE		ID
- + 0 . 0	-		S52(2)	"	"
- + 0 . 9 3 7	-		S52(3)	"	"
- + 1 . 0	-		S52(4)	"	"
- + 1 2 . 0	-		S52(5)	"	"
-			S52(6) TOTAL OF 10 P52		"
- TQE = + 0 . 7 7 1	-	R E T R A C T M O T O R	TQE(1) RETRACT MOTOR TORQUE LIMIT, ELECTRONIC FT-LAS		
- + 0 . 7 7 1	-	T O Q U E	TQE(2)	"	"
- + 0 . 7 6 2	-	T O Q U E	TQE(3)	"	"
- + 0 . 7 5	-	T O Q U E	TQE(4)	"	"
- + 0 . 7 2 9	-	T O Q U E	TQE(5)	"	"
- + 0 . 7 0 3	-	T O Q U E	TQE(6)	"	"
- + 0 . 6 5 6	-		TQE(7)	"	"
- + 0 . 6 8 2 5	-		TQE(8)	"	"
- + 0 . 4 5 8	-		TQE(9)	"	"
- + 0 . 2 3 9	-		TQE(10)	"	"
- + 0 . 0	-		TQE(11)	"	"
- + 0 . 0	-		TQE(12)	"	"

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FORM 114-C-IN-A7NO

**FORTRAN FLOATING 8 DIGIT DECIMAL DATA**

DATE PAGE /6 of 17 JOB NO.

DECK NO. PROGRAMMER

NUMBER	D	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH	UNITS
1	RPM = + 0.0 -		RPM(1) RETRACT MOTOR RATE LIMIT, RATE TAKE		RAD/SEC
2	+ 2.0 9 . 4		RPM(2)	"	"
3	+ 4.1 8 . 9		RPM(3)	"	"
4	+ 5.2 3 . 5		RPM(4)	"	"
5	+ 6.2 8 . 2		RPM(5)	"	"
6	+ 7.3 2 . 9		RPM(6)	"	"
7	+ 8.3 7 . 6		RPM(7)	"	"
8	+ 9.4 2 . 3		RPM(8)	"	"
9	+ 1.0 4 7 . 0		RPM(9)	"	"
10	+ 1.1 5 1 . 7		RPM(10)	"	"
11	+ 1.2 3 0 . 0		RPM(11)	"	"
12	+ 1.2 3 0 . 0		RPM(12)	"	"
					TOTAL OF 15 RTTS

FORM 114-C-14 (BOND)



### Format: FLOATING 6 DIGIT DECIMAL DATA

DECK NO. PROGRAMMER DATE 12 of 12 PAGE 12 of 12 JOB NO. —

NUMBER	D	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
TTL 1 = 48H	-3		TITLE "CASE 3 ASTP, HYDRAULIC SYSTEM"	
ASTP, HYDRAULIC SYSTEM	-		IS WRITTEN ON CART AND PRINT. LENGTH IS LIMITED TO 48 SPACES FOLLOWING N.	
N	-		PLACE COMMA AT END	
I	-	73	THE FOLLOWING ARE INTEGER NUMBERS, COMMAS REPLACE DECIMAL POINTS, MUST BE NEXT TO NUMBER.	
I PHASE = 1	-		TYPE OF START = 1 CONTRACT, = 0 NO CONTACT, = 3 LATED	
N = 52,	-		NUMBER OF VARIABLES INTEGRATED	
IRCS = 3,	-		ACTIVATES RCS, = 1 ACTIVE VEHICLE, = 2 TARGET, = 3 BOTH, BOTH	
Z.V.E.H = 1,	-		TYPE CONTROL SYSTEM FOR TARGET, SOURCE = 1, SAVING	
ISIMPL = 1,	-		TYPE INITIAL CONDITION INPUT -- ALWAYS = 1	
JN = 8,	-		NUMBER OF ATTENUATION DRIFTS AND POINTS IN CD/DR	
MPLQT = 7,	-		PLOTS EVER "MPLQT" INTEGRATIONS	
NFIGNG = 39	-		NUMBER OF DIVIDES ON GUIDE RING	
NATTEN = 6,	-		" "	
IGRAPH = 1	-		" " ATTENATORS	
ITABLE = 1	-		= 1 PLOT CART, = 0 NO PLOTS	
IH = -20,	-		ALWAYS = -20	
IXTRA = 3,	-		NUMBER OF POINTS IN TABLE ADO(8) + 100(11)	
ITSPPG = 6,	-		" " " " ORDER(1) BY 100(1)	
JN2 = 5,	-		" " " " " " CPE(1) BY SSZ(1)	
JN3 = 12,	-		" " " " " " TQE(1) BY RPM(1)	
EEND	-			



**Space Division**  
**Rockwell International**

FCC ID: 1AB4A (NCH)



#### **ASTP DOCKING PROGRAM INPUT DATA**

The following pages list of the load analyses, computer input data. The input data describe the docking system characteristics, docking vehicle mass properties, and vehicle control system characteristics as used for Apollo CSM docking to the Soyuz.

**ASTP, 3 GUIDE**  
**FORTRAN FIXED**  
**DECIMAL DATA**  
**SYNTHETIC HYDRAULIC**  
**PROGRAMMER**  
**DECK NO.**

DATE 2-13-72. PAGE 1 of 1/2 JOB NO.

NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
1	& INPUT	ACTIVE VEHICLE MASS PROPERTIES "A" ARRAY	NAME LIST NAME (PPT) IN PUNCH OF FILE CAT IN DIRECT
2	A + 0.0	A(1)	0.000
3	+ 954.0	A(2)	ACTIVE VEHICLE MASS
4	+ 15767.0	A(3)	INERTIA (SLUGS FT)
5	+ 01444.0	A(4)	INERTIA (SLUGS FT)
6	+ 81254.0	A(5)	INERTIA (SLUGS FT)
7	- A + 2573.0	A(6)	INERTIA (SLUGS FT)
8	- 527.0	A(7)	INERTIA (SLUGS FT)
9	+ 681.0	A(8)	INERTIA (SLUGS FT)
10	+ .48	A(9)	Y-DIST. C.G. TO G ( FT )
11	+ .0033	A(10)	Z-DIST. C.G. TO G ( FT )
12	+ 19.5	A(11)	X-DIST. C.G. TO DOWNGEAR (FT)
13	C 5 = + 0.0	B(1)	" ARRAY B(1) NOT USED
14	+ 465.	B(2)	TARGET VEHICLE MASS ( SLUGS )
15	+ 3507.	B(3)	SIX INERTIA (SLUGS FT)
16	+ 18223.	B(4)	INERTIA (SLUGS FT)
17	+ 17789.	B(5)	INERTIA (SLUGS FT)
18	- 434.	B(6)	INERTIA (SLUGS FT)
19	+ 217.	B(7)	INERTIA (SLUGS FT)
20	- 14.	B(8)	INERTIA (SLUGS FT)
21	+ .0033	B(9)	Y-DIST. C.G. TO G ( FT )
22	- .0033	B(10)	Z-DIST. C.G. TO G ( FT )
23	- 11.65	B(11)	X-DIST. C.G. TO DOWNGEAR (FT)

ENCLOSURE (4)

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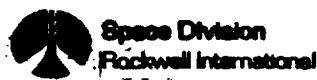


## FORTRAN FIXED 10 DIGIT DECIMAL DATA

DATE PAGE 2 of 16 JOB NO.

## PROGRAMMER

DECK NO.	NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
C 000	+ 0. 0	C(1) AREA1Y	C(1) NOT USED	
C 001	+ 2. 0	C(2) DA, RADIUS TO ATTENUATOR CENTER - Y HILL SIDE (FT)		
C 002	+ 3.9	C(3) DT, RADIUS TO ATTENUATOR CENTER TO RAIL ( FT )		
C 003	+ 2. 74	C(4) ALPHA, ANGLE TO PT DT ATTENUATOR, RA. RAIL ( DEC )		
C 004	+ 6.0.	C(5) EXT, +10 RADIANS (PI/2), -10 RADIANS (PI/2) ( N/D )		
C 005	+ 1. 0	C(6) NOT USED = 0.0		
C 006	+ 0. 0	C(7) THMA, HALF ANGLE BEAM ATTENUATOR 3-Y HILL SIDE (DN)		
C 007	+ 30. 0	C(8) THMT, HALF ANGLE BEAM ATTENUATOR - RAIL SIDE (DIO)		
C 008	+ 6. 0	C(9) SKS, SPRING CONSTANT OF RAIL (LBS/FT)		
C 009	+ 97800.	C(10) RETRAC CYLINDER AREA (IN <sup>2</sup> )		
C 010	+ 2. 767	C(11) RETRACT POSITION AREA MUST BE LARGER AREA (IN <sup>2</sup> )		
C 011	+ 00000. 0	C(12) NOT USED		
C 012	+ 0. 0	C(13) NOT USED		
C 013	+ 0. 0	C(14) FRICP, ATTENUATOR RADIUS IN FEET (IN)		
C 014	+ 0. 0	C(15) NOT USED		
C 015	+ 0. 0	C(16) FRICP, ATTENUATOR RADIUS IN FEET (IN)		
C 016	+ 1. 25	C(17) NOT USED		
C 017	+ 0. 0	C(18) ACCUMULATED DISTANCE AREA (SAFO) (IN <sup>2</sup> )		
C 018	+ 0. 0	C(19) THDG0, ANGULAR DISTANCE - RAIL (ARC)		
C 019	+ 0. 0	C(20) XMIS, MISS DISTANCE - RAIL (FT)		
C 020	+ 0. 995	C(21) LOAD, +10 MILITZ, +00 PHASE 3 (N/D)		
C 021	+ 0. 0	C(22) CHECK, STRONG TEST NECKBOLT LOAD LIMIT (FT)		
C 022	+ 0. 0	C(23) RSSX, Y DIST. TO STRUCTURE CHECK POINT AT ENDS (FT)		
C 023	+ 0. 0	C(24) RSSR, RADIUS OF STRUCTURE AT ENDPOINTS FOR CHECK (FT)		



# FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. PROGRAMMER DATE PAGE ? of 16 JOB NO.

NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
C + 1.2	C(25) LENGTH, ORIFICE, L = N.G. ? M	(IN.)	
I + 2.229.7	C(26) BFR, IN INCHES, AREA	(IN <sup>2</sup> )	
E + 3.875	C(27) XKV, KINETIC VISCOSITY	(IN <sup>2</sup> /SEC)	
E + 0.0000948	C(28) RHO, HYDRAULIC FLUID MASS DENSITY (LB SEC/IN <sup>3</sup> )		
E + 1.22718	C(29) AC, ATTENUATION CYLINDER AREA (IN <sup>2</sup> )		
E + 1.9635	C(30) S, METERING PIN AREA (IN <sup>2</sup> )		
G + 0.0	C(31)		
- + 0.0	C(32)		
X + 0.0	C(33)		
X + 0.0	C(34)		
X + 0.0	C(35)	USED INTERNALLY FOR VECTOR STORE	
G + 0.0	C(36)		
G + 0.0	C(37)		
G + 0.0	C(38)		
G + 0.0	C(39)		
G + 0.0	C(40)	THANG, ANGLE FROM PLANE TO THICK PLATE (DEG)	
I 2.0	C(41) THTR, RELATIVE ANGLE, BTW VEHICLE & PLANE (DEG)		
+ 1.00	C(42) THWL, THICKNESS OF PLANE WRT VEHICLE (DEG)		
C + 3.28	C(43) VL, AT THE VEHICLE, CAPITAL VL. HGT. TARGET (FPS)		
+ 0.0	C(44) OMEGA, ROT RATE AROUND TARGET (RPM)		
+ 1.0	C(45) OMERT, INTEGRAL AVG. RATE - OMEGA (RPM)		
+ 0.0	C(46) THOMEL, AVG. RATE, RADIAN/SEC, PLANE (RAD/SEC)		
+ 0.0	C(47) THOMEL, PLANE (RAD/SEC)		
+ 0.0	C(48) VLMAN, USED ONLY WITH THOMEL		



Space Division  
Rockwell International

FORTRAN FIXED 10 ● DIGIT DECIMAL DATA

DATE PAGE 4 of 16 JOB NO.

DECK NO.	PROGRAMMER	NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
-C 0.0		D 0.0.0	C(49) VL MAX, USED ONLY WITH T-1100J	D(1) ARRAY	D(1) USED INTERNALLY
-E 0.0		+0.0.0	C(30) VAMIN,	D(2)	USED INTERNALLY
-F 0.0		+0.0.0		D(3)	USED INTERNALLY
-G 0.0		+0.0.0		D(4)	USED INTERNALLY
-H 0.0		+0.0.0		D(5)	NOT USED
-I 0.0		+1.0.0		D(6)	2D, RE INITIALIZES STANDARD DATA
-J 0.0		+7.0.5		D(7)	SPAN(1), LENGTH CABLE FROM MOTOR TO PULLEY (1) (FT)
-K 0.0		D +7.0.5		D(8)	SPAN(2)
-L 0.0		+7.0.5		D(9)	SPAN(3)
-M 0.0		+0.0.0		D(10)	SPAN(4)
-N 0.0		+0.0.0		D(11)	SPAN(5)
-O 0.0		+0.0.0		D(12)	SPAN(6)
-P 0.0		0.0.0		D(13)	USED INTERNALLY
-Q 0.0		0.0.0		D(14)	0.0.0
-R 0.0		0.0.0		D(15)	0.0.0
-S 0.0		0.0.0		D(16)	0.0.0
-T 0.0		0.0.0		D(17)	0.0.0
-U 0.0		0.0.0		D(18)	0.0.0
-V 0.0		0.0.0		D(19)	0.0.0
-W 0.0		0.0.0		D(20)	0.0.0
-X 0.0		0.0.0		D(21)	0.0.0
-Y 0.0		0.0.0		D(22)	0.0.0
-Z 0.0		0.0.0		D(23)	0.0.0
-A 0.0		0.0.0		D(24)	0.0.0
-B 0.0		0.0.0		D(25)	0.0.0
-C 0.0		0.0.0		D(26)	0.0.0
-D 0.0		0.0.0		D(27)	0.0.0
-E 0.0		0.0.0		D(28)	0.0.0
-F 0.0		0.0.0		D(29)	0.0.0
-G 0.0		0.0.0		D(30)	0.0.0
-H 0.0		0.0.0		D(31)	0.0.0
-I 0.0		0.0.0		D(32)	0.0.0
-J 0.0		0.0.0		D(33)	0.0.0
-K 0.0		0.0.0		D(34)	0.0.0
-L 0.0		0.0.0		D(35)	0.0.0
-M 0.0		0.0.0		D(36)	0.0.0
-N 0.0		0.0.0		D(37)	0.0.0
-O 0.0		0.0.0		D(38)	0.0.0
-P 0.0		0.0.0		D(39)	0.0.0
-Q 0.0		0.0.0		D(40)	0.0.0
-R 0.0		0.0.0		D(41)	0.0.0
-S 0.0		0.0.0		D(42)	0.0.0
-T 0.0		0.0.0		D(43)	0.0.0
-U 0.0		0.0.0		D(44)	0.0.0
-V 0.0		0.0.0		D(45)	0.0.0
-W 0.0		0.0.0		D(46)	0.0.0
-X 0.0		0.0.0		D(47)	0.0.0
-Y 0.0		0.0.0		D(48)	0.0.0
-Z 0.0		0.0.0		D(49)	0.0.0
-A 0.0		0.0.0		D(50)	0.0.0
-B 0.0		0.0.0		D(51)	0.0.0
-C 0.0		0.0.0		D(52)	0.0.0
-D 0.0		0.0.0		D(53)	0.0.0
-E 0.0		0.0.0		D(54)	0.0.0
-F 0.0		0.0.0		D(55)	0.0.0
-G 0.0		0.0.0		D(56)	0.0.0
-H 0.0		0.0.0		D(57)	0.0.0
-I 0.0		0.0.0		D(58)	0.0.0
-J 0.0		0.0.0		D(59)	0.0.0
-K 0.0		0.0.0		D(60)	0.0.0
-L 0.0		0.0.0		D(61)	0.0.0
-M 0.0		0.0.0		D(62)	0.0.0
-N 0.0		0.0.0		D(63)	0.0.0
-O 0.0		0.0.0		D(64)	0.0.0
-P 0.0		0.0.0		D(65)	0.0.0
-Q 0.0		0.0.0		D(66)	0.0.0
-R 0.0		0.0.0		D(67)	0.0.0
-S 0.0		0.0.0		D(68)	0.0.0
-T 0.0		0.0.0		D(69)	0.0.0
-U 0.0		0.0.0		D(70)	0.0.0
-V 0.0		0.0.0		D(71)	0.0.0
-W 0.0		0.0.0		D(72)	0.0.0
-X 0.0		0.0.0		D(73)	0.0.0
-Y 0.0		0.0.0		D(74)	0.0.0
-Z 0.0		0.0.0		D(75)	0.0.0
-A 0.0		0.0.0		D(76)	0.0.0
-B 0.0		0.0.0		D(77)	0.0.0
-C 0.0		0.0.0		D(78)	0.0.0
-D 0.0		0.0.0		D(79)	0.0.0
-E 0.0		0.0.0		D(80)	0.0.0
-F 0.0		0.0.0		D(81)	0.0.0
-G 0.0		0.0.0		D(82)	0.0.0
-H 0.0		0.0.0		D(83)	0.0.0
-I 0.0		0.0.0		D(84)	0.0.0
-J 0.0		0.0.0		D(85)	0.0.0
-K 0.0		0.0.0		D(86)	0.0.0
-L 0.0		0.0.0		D(87)	0.0.0
-M 0.0		0.0.0		D(88)	0.0.0
-N 0.0		0.0.0		D(89)	0.0.0
-O 0.0		0.0.0		D(90)	0.0.0
-P 0.0		0.0.0		D(91)	0.0.0
-Q 0.0		0.0.0		D(92)	0.0.0
-R 0.0		0.0.0		D(93)	0.0.0
-S 0.0		0.0.0		D(94)	0.0.0
-T 0.0		0.0.0		D(95)	0.0.0
-U 0.0		0.0.0		D(96)	0.0.0
-V 0.0		0.0.0		D(97)	0.0.0
-W 0.0		0.0.0		D(98)	0.0.0
-X 0.0		0.0.0		D(99)	0.0.0
-Y 0.0		0.0.0		D(100)	0.0.0
-Z 0.0		0.0.0		D(101)	0.0.0
-A 0.0		0.0.0		D(102)	0.0.0
-B 0.0		0.0.0		D(103)	0.0.0
-C 0.0		0.0.0		D(104)	0.0.0
-D 0.0		0.0.0		D(105)	0.0.0
-E 0.0		0.0.0		D(106)	0.0.0
-F 0.0		0.0.0		D(107)	0.0.0
-G 0.0		0.0.0		D(108)	0.0.0
-H 0.0		0.0.0		D(109)	0.0.0
-I 0.0		0.0.0		D(110)	0.0.0
-J 0.0		0.0.0		D(111)	0.0.0
-K 0.0		0.0.0		D(112)	0.0.0
-L 0.0		0.0.0		D(113)	0.0.0
-M 0.0		0.0.0		D(114)	0.0.0
-N 0.0		0.0.0		D(115)	0.0.0
-O 0.0		0.0.0		D(116)	0.0.0
-P 0.0		0.0.0		D(117)	0.0.0
-Q 0.0		0.0.0		D(118)	0.0.0
-R 0.0		0.0.0		D(119)	0.0.0
-S 0.0		0.0.0		D(120)	0.0.0
-T 0.0		0.0.0		D(121)	0.0.0
-U 0.0		0.0.0		D(122)	0.0.0
-V 0.0		0.0.0		D(123)	0.0.0
-W 0.0		0.0.0		D(124)	0.0.0
-X 0.0		0.0.0		D(125)	0.0.0
-Y 0.0		0.0.0		D(126)	0.0.0
-Z 0.0		0.0.0		D(127)	0.0.0
-A 0.0		0.0.0		D(128)	0.0.0
-B 0.0		0.0.0		D(129)	0.0.0
-C 0.0		0.0.0		D(130)	0.0.0
-D 0.0		0.0.0		D(131)	0.0.0
-E 0.0		0.0.0		D(132)	0.0.0
-F 0.0		0.0.0		D(133)	0.0.0
-G 0.0		0.0.0		D(134)	0.0.0
-H 0.0		0.0.0		D(135)	0.0.0
-I 0.0		0.0.0		D(136)	0.0.0
-J 0.0		0.0.0		D(137)	0.0.0
-K 0.0		0.0.0		D(138)	0.0.0
-L 0.0		0.0.0		D(139)	0.0.0
-M 0.0		0.0.0		D(140)	0.0.0
-N 0.0		0.0.0		D(141)	0.0.0
-O 0.0		0.0.0		D(142)	0.0.0
-P 0.0		0.0.0		D(143)	0.0.0
-Q 0.0		0.0.0		D(144)	0.0.0
-R 0.0		0.0.0		D(145)	0.0.0
-S 0.0		0.0.0		D(146)	0.0.0
-T 0.0		0.0.0		D(147)	0.0.0
-U 0.0		0.0.0		D(148)	0.0.0
-V 0.0		0.0.0		D(149)	0.0.0
-W 0.0		0.0.0		D(150)	0.0.0
-X 0.0		0.0.0		D(151)	0.0.0
-Y 0.0		0.0.0		D(152)	0.0.0
-Z 0.0		0.0.0		D(153)	0.0.0
-A 0.0		0.0.0		D(154)	0.0.0
-B 0.0		0.0.0		D(155)	0.0.0
-C 0.0		0.0.0		D(156)	0.0.0
-D 0.0		0.0.0		D(157)	0.0.0
-E 0.0		0.0.0		D(158)	0.0.0
-F 0.0		0.0.0		D(159)	0.0.0
-G 0.0		0.0.0		D(160)	0.0.0
-H 0.0		0.0.0		D(161)	0.0.0
-I 0.0		0.0.0		D(162)	0.0.0
-J 0.0		0.0.0		D(163)	0.0.0
-K 0.0		0.0.0		D(164)	0.0.0
-L 0.0		0.0.0		D(165)	0.0.0
-M 0.0		0.0.0		D(166)	0.0.0
-N 0.0		0.0.0		D(167)	0.0.0
-O 0.0		0.0.0		D(168)	0.0.0
-P 0.0		0.0.0		D(169)	0.0.0
-Q 0.0		0.0.0		D(170)	0.0.0
-R 0.0		0.0.0		D(171)	0.0.0
-S 0.0		0.0.0		D(172)	0.0.0
-T 0.0		0.0.0		D(173)	0.0.0
-U 0.0		0.0.0		D(174)	0.0.0
-V 0.0		0.0.0		D(175)	0.0.0
-W 0.0		0.0.0		D(176)	0.0.0
-X 0.0		0.0.0		D(177)	0.0.0
-Y 0.0		0.0.0		D(178)	0.0.0
-Z 0.0		0.0.0		D(179)	0.0.0
-A 0.0		0.0.0		D(180)	0.0.0
-B 0.0		0.0.0		D(181)	0.0.0
-C 0.0		0.0.0		D(182)	0.0.0
-D 0.0		0.0.0		D(183)	0.0.0
-E 0.0		0.0.0		D(184)	0.0.0
-F 0.0		0.0.0		D(185)	0.0.0
-G 0.0		0.0.0		D(186)	0.0.0
-H 0.0		0.0.0		D(187)	0.0.0
-I 0.0		0.0.0		D(188)	0.0.0
-J 0.0		0.0.0		D(189)	0.0.0
-K 0.0		0.0.0		D(190)	0.0.0
-L 0.0		0.0.0		D(191)	0.0.0
-M 0.0		0.0.0		D(192)	0.0.0
-N 0.0		0.0.0		D(193)	0.0.0
-O 0.0		0.0.0		D(194)	0.0.0
-P 0.0		0.0.0		D(195)	0.0.0
-Q 0.0		0.0.0		D(196)	0.0.0
-R 0.0		0.0.0		D(197)	0.0.0
-S 0.0		0.0.0		D(198)	0.0.0
-T 0.0		0.0.0		D(199)	0.0.0
-U 0.0		0.0.0		D(200)	0.0.0
-V 0.0		0.0.0		D(201)	0.0.0
-W 0.0		0.0.0		D(202)	0.0.0
-X 0.0		0.0.0		D(203)	0.0.0
-Y 0.0		0.0.0		D(204)	0.0.0
-Z 0.0		0.0.0		D(205)	0.0.0
-A 0.0		0.0.0		D(206)	0.0.0
-B 0.0		0.0.0		D(207)	0.0.0
-C 0.0		0.0.0		D(208)	0.0.0
-D 0.0		0.0.0		D(209)	0.0.0
-E 0.0		0.0.0		D(210)	0.0.0
-F 0.0		0.0.0		D(211)	0.0.0
-G 0.0		0.0.0		D(212)	0.0.0
-H 0.0		0.0.0		D(213)	0.0.0
-I 0.0		0.0.0		D(214)	0.0.0
-J 0.0		0.0.0		D(215)	0.0.0
-K 0.0		0.0.0			

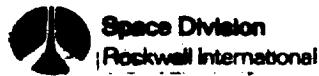
## FORTRAN FIXED 10 DIGIT DECIMAL DATA

DATE \_\_\_\_\_

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JOB NO. \_\_\_\_\_

DECK NO.	PROGRAMMER	NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
- D + 34 . 0			D(19) WAIT, RETRACK START TIME (SEC)		
- 358			D(20) XC,R, DISTANCE FROM ATTACH TO ABLE L. 44 . (FT)		
+ 2 . 54			D(21) CRAD, RADIUS TO GEAR CENTER POINTS (FT.)		
+ 2 . 54			D(22) CRAD R, RADIUS TO RIM (INCHES ATTACH PT) (FT.)		
+ 0 . 0			D(23) USED INTERNALLY		
+ 0 . 60			D(24) EFF, RETRACT MOTOR GEAR EFFICIENCY (1/10)		
- D + 65 60 .			D(25) GEAR, GEAR RATIO, RATIO (1/10)		
+ 0 . 002 13			D(26) DMOTOR, MOMENT OF INERTIA @ MOTOR SHAFT (MM-FT <sup>2</sup> )		
+ 0 . 0			D(27) NOT USED		
+ 0 . 0			D(28) NOT USED		
+ 0 . 0			D(29) TIME T11 . 0	D(29) IV1 USED ONLY BY INPUT	
+ 0 . 0			D(29) IV2 USED ONLY BY INPUT		
+ 0 . 0			E . ARRAY E(1) USE OF INITIALLY		
+ 0 . 0			E(2) USE OF INITIALLY		
+ 0 . 0			F(3) DATA, ADDRESS OF DATA TO CARTRIDGE (SEC)		
+ 0 . 001			F(4) DATA SEARCH INTERVAL = QWORD		
+ 0 . 0			G(5) CASE NUMBER		
+ 0 . 0			H(6) JUMPED / INTERRUPT		
+ 0 . 2			I(7) QWORD, PROGRAM POINT INTERNAL (SEC)		
+ 0 . 009 09			J(8) DOUBLE: ENHANCED PLOT TIME (SEC)		
+ 0 . 0			K(9) ZSEG9 INTERNAL		
+ 0 . 0			L(10) ZSEG4 INTERNAL		

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OF POOR QUALITY



# FORTRAN FIXED 10 DIGIT DECIMAL DATA

DATE 6/6/68 PAGE 6 of 16 JOB NO.

## PROGRAMMER

DECK NO.	NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
1	F F = +. 0 0 . 0 5	F(1) PROGRAM CONTROL DATA	'F' ARRAY, A2A, MAX. INTC, ERROR AFTER CAPTURE	
2	+. 0 0 0 5		F(2) TIME, INITIAL, STEP SIZE ( SEC )	
3	+ 0 . 0		F(3) N, NUMBER OF STATE VARIABLES ( 10 )	
4	+ 0 . 0		F(4) A2, MIN. INTIC, ERROK	
5	+ 0 . 0		F(5) A2, MAX. STEP SIZE ( SEC )	
6	+ 0 . 0		F(6) KAI, 200 HANKE STEP, 1.0 FIXESSER AM, -10 STEP AM	
7	+ 0 . 0		F(7) A2, MAX. INTIC, ERROK	
8	- F +. 0 0 0 0 1		F(8) A4, MIN. STEP SIZE BEFORE CAPTURE ( SEC )	
9	+. 0 0 0 3		F(9) A7, REDUCTION FACTOR FOR STEP SIZE ( 10 )	
10	+ 0 . 2		F(10) A4A, MIN. STEP SIZE BEYOND CAPTURE ( SEC )	
11	+ 0 . 0 1			
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FORTRAN FIXED 10 • DIGIT DECIMAL DATA

DATE PAGE 7 of 16 JOB NO.

DECK NO.	PROGRAMME	NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
0	0	18	AA(13) BUNYA, MINIMUM JET BURN TIME	( SEC )	
0	0	2	AA(14) DBANYA, ATTITUDE DEGRADATION, RATE	( DEG )	
0	0	2	AA(15) OBANYA,	"	PITCH ( DEG )
0	0	2	AA(16) DSANZA,	"	YAW ( DEG )
0	0	3	AA(17) FXA, IF >0 HOLDS ATTITUDE AFTER CAPTURE LATCH		
0	0	3	AA(18) REACTA, X-THRUST TIME AFTER CAPTURE	( SEC )	
0	0	4	AA(19) BANXA, PITCH GAIN AFTER CAPTURE, AND BYPASS/SEC		
0	0	5	AA(20) BANYA,	"	PITCH ( DEG/SEC )
0	0	5	AA(21) BANZA,	"	YAW ( DEG/SEC )
0	0	6	AN(22) I.R., NOT USED		
0	0	7	AA(23) RMAYA, ROLL ATTITUDE HOLD LIMIT ( DEG )		
0	0	8	M(24) PMAYA , PANYA	"	( DEG )
0	0	9	M(25) YMAYA , PITCH	"	( DEG )
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JOB NO. \_\_\_\_\_

DECK NO.	PROGRAMMER	NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
1	H + I.C.	1	TARGET POSITION control system	AT(7) XRYT, PITCH RATE GAIN ( DRC/SEC )	
2	T.I.O.	2		AT(8) ARZT, YAW RATE GAIN ( DRC/SEC )	
3	+ / +	3		AT(9) ADPHI, ROLL ATTITUDE GAIN ( DRC/DEC )	
4	+ / +	4		AT(10) ADTH, PITCH ATTITUDE GAIN ( DRC/DEC )	
5	+ / +	5		AT(11) ADPST, YAW ATTITUDE GAIN ( DCC/DEC )	
6	+ / +	6		AT(12) DBANXT, ROLL ATTITUDE DATA BAND ( DRC )	
7	+ / +	7		AT(13) DBANYT, PITCH " " ( DRC )	
8	+ / +	8		AT(14) DBANZT, YAW " " ( DRC )	
9	+ / +	9		AT(15) THCOMT, PITCH ATTITUDE COMMAND ( DRC )	
10	+ / +	10		AT(16) PHCOMT, ROLL ATTITUDE COMMAND ( DRC )	
11	+ / +	11		AT(17) PSCOMT, YAW ATTITUDE COMMAND ( DRC )	
12	+ / +	12		AT(18) REACTT, TIME X-THRUST CUTOFF ATTITUDE CHANGE (SEC)	
13	+ / +	13		AT(19) BANXT, ROLL RATE GAIN AFTER CAPTURE (SEC/MIN)	
14	+ / +	14		AT(20) BANYT, PITCH RATE GAIN AFTER CAPTURE (SEC/MIN)	
15	+ / +	15		AT(21) BANZT, YAW RATE GAIN AFTER CAPTURE (SEC/MIN)	
16	+ / +	16		AT(22) DGT, DIST. FROM C.G. TO X-JETS ( FT )	
17	+ / +	17		AT(23) DQZ, DIST. FROM C.G. TO Z-JETS ( FT )	
18	+ / +	18		AT(24) DQ3, DIST. FROM C.G. TO Y-JETS ( FT )	
19	+ / +	19		AT(25) FMT, IF > 0 Holes ATTITUDE AFTER CAPTURE	
20	+ / +	20		AT(26) RMAXI, ROLL ATTITUDE ERROR LIMIT ( DEC )	
21	+ / +	21		AT(27) YMAXI, PITCH ATTITUDE ERROR LIMIT ( DEC )	
22	+ / +	22		AT(28) PMAXI, YAW ATTITUDE ERROR LIMIT ( DEC )	
23	+ / +	23		AT(29) TUES INTELLIGENTLY	
24	+ / +	24		AT(30) USES INTELLIGENCE	

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DECK NO.	PROGRAMMER	NUMBER, $\pi$ (-65E)	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
1	I C 0 = + i 3 1 4 (6189)	NUMBER OF ATTRIBUTES	"C0" ARRAY COL(1) ATTENUATOR OFFICE(IN)		
2	i 3 1 4	(18019)	C0(2)		
3	+ i 0 4	(0025)	C0(3)		
4	+ . D 0 3 4 (.005)		C0(4)		
5	+ . 0 0 1 8 5 (.00725)		C0(5)		
6	+ i 0 0 1 0 8 (.0056)		C0(6)		
7	+ i 0 0 0 7 (.0012)		C0(7)		
8	+ i 0 0 0 2 (.0012)		C0(8)		
9	+ i 0 0 0 1		C0(9)		
10	+ i 0 0 0 0		C0(10)		
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Rockwell International

FORTRAN      FIXED      10 DIGIT DECIMAL DATA

DATE 10-01-76 PAGE 10 of 16 JOB NO.

DECK NO.	PROGRAMMER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
-K T = 0.0		T(1) XA	COMPUTED INITIALLY	"
+0.0		T(2) YA	"	"
+0.0		T(3) ZA	"	"
+0.0		T(4) XT	"	"
+0.0		T(5) YT	"	"
+0.0		T(6) ZT	"	"
+0.0		T(7) OM6(XA)	ADJ. USED WHICH IS ADJ. IF USED	"
+0.0		T(8) OM6(YA)	"	"
+0.0		T(9) OM6(ZA)	"	"
+0.0		T(10) OM6(XT)	"	"
+0.0		T(11) OM6(YT)	"	"
+0.0		T(12) OM6(ZT)	"	"
+0.0		T(13) THA	"	"
+0.0		T(14) PHA	"	"
+0.0		T(15) PSA	"	"
+0.0		T(16) THT	"	"
+0.0		T(17) PHT	"	"
+0.0		T(18) PST	"	"
+0.0		T(19) YD X-DIST FROM BASE TO TIP OF ATTEN (FT)	"	"
+1.0		T(20) YP AT t=0	"	"
+0.0		T(21) ZP	"	"
+0.0		T(22) DIST ATTEN	"	"
+1.0		T(23)	"	"
+0.0		T(24)	"	"
+1.0			"	"

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**FORTRAN FIXED 10 • DIGIT DECIMAL DATA -**

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DECK NO.	PROGRAMMER	NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
1	K + .9 85	1	INITIAL CONDITIONS	T(25) XAD, ACTIVE VEHICLE NUMBER X VEL (FPS)	
2	0. 0	1	XAD(YAD)	T(26) YAD, " Y VEL (FDS)	
3	0. 0	1	XAD(YAD)	T(27) ZAD, " Z VEL (FPS)	
4	0. 0	1	XAD(YAD)	T(28) XTD, TARGET VEHICLE INITIAL X VEL (FPS)	
5	0. 0	1	XAD(YAD)	T(29) YTD, " Y VEL (FPS)	
6	0. 0	1	XAD(YAD)	T(30) ZTD, " Z VEL (FPS)	
7	-K + 1240. 0	1		T(31) -T(42) USED INTERNALLY	
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FORTRAN FIXED 10 • DIGIT DECIMAL DATA

PAGE 12 of 14 JOB NO. \_\_\_\_\_

DATE \_\_\_\_\_

PROGRAMMER \_\_\_\_\_

DECK NO.	NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
1	+ 0. 0	RING & CHOC.	ADD(13) AEE, = DIST FROM RING C.G. TO FINGER/TIP (FT)	
2	+ 0. 7941	DATA	ADD(14) BET, ANGLE FROM X-NODE FINGER TIP (RAD)	
3	+ 3. 084		ADD(15) TIPSET, ANG DIST FROM RING TO FINGER TIP (FT)	
4	+ 0. 0		ADD(16) TPRO, COMPUTED INTERANLLY	
5	+ 1. 16		ADD(17) CHOP, AXIAL CUT LENGTH OF FINGERS (FT)	
6	+ 2. 1800.		ADD(18) SK EQUIVALENT SPANN CONST OF FINGERS (4%)	
7	+ 0. 0		ADD(19) USED INTERANLLY	
8	+ 0. 0		ADD(20) USED INTERANLLY	
9	+ 8. 0. 0		ADD(21) THRU ADD(25) USED INTERANLLY	
10	+ 0. 6200.		ADD(26) SKL, LATCH STRUCTURE SPANN CONST. (LO/FT)	
11	+ 0. 0		ADD(29) - (40) CO2 ARRAY NOT USED	
12	+ 9. 0. 0		ADD(41) THRU ADD(49) NOT USED	
13	+ 0. 0		ADD(50)	
14	+ 0. 0		ADD(51)	
15	+ 0. 0		AM (52) { NOT USED }	
16	+ 0. 0		AM (53) { NOT USED }	
17	+ 0. 0		ADD(54) { }	
18	+ 0. 0		ADD(55) { }	
19	+ 0. 0		ADD(56) NOT USED	
20	+ 0. 0		ADD(57) XPO, ORIGINAL Y DIST OF ATTN. (FT)	
21	+ 1. 583		ADD(58) NOT USED	
22	+ 0. 0		ADD(59) { USED INTERANLLY }	
23	+ 0. 0		ADD(60) { }	
24	+ 0. 0		ADD(61) THRU ADD(70) SS(i) NOT USED	
25	+ 1. 0400.			

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# FORTRAN FIXED 10 • DIGIT DECIMAL DATA

DATE 13 of 12 JOB NO.

DECK NO.	PROGRAMMER	NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
1		4 . 325		ADD(71) X(L, ANGL DIST. FAN, FINISHING RAD TO LAT/LL (FT)	
2		+ 2 . 34		ADD(72) RADL, RADIUS TO LAT/LL (FT)	
3		+ 0 . 0		ADD(73) VOT USFU	
4		+ 50 . 0		ADD(74) STOPL, STOP TIME AFTER TOTAL LAT/LL (SEC)	
5		+ 0 . 007		ADD(75) HYSA, BURN HYSTESIS ACTIV THRESHOLD (SEC)	
6		+ 0 . 007		ADD(76) HYST, BURN HYSTESIS TARGET THRESHOLD (SEC)	
7		+ 0 . 007		ADD(77) - (SO) NOT USED	
8		+ 4 . 0 . 0		ADD(81) ATTMAJOR TENSION SMOOTH FUDGE TABLE PT#1 (LB)	
9		+ 0 . 0		ADD(82)	"
10		+ 50 .		ADD(83)	"
11		+ 320000.		ADD(84)	"
12		+ 0 . 50		MOD(85)	"
13		+ 0 . 0		ADD(86)	"
14		+ 0 . 0		ADD(87)	"
15		+ 0 . 0		ADD(88)	"
16		+ 0 . 0		ADD(89)	"
17		+ 0 . 0		ADD(90)	"
18		+ 0 . 0		ADD(91)	"
19		+ 0 . 0		ADD(92)	"
20		+ 0 . 0		ADD(93)	"
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27		+ 0 . 0		ADD(100)	"
28		+ 0 . 0		ADD(101)	"
29		+ 0 . 0		ADD(102)	"
30		+ 0 . 0		ADD(103)	"
31		+ 0 . 0		ADD(104)	"
32		+ 0 . 0		ADD(105)	"
33		+ 0 . 0		ADD(106)	"
34		+ 0 . 0		ADD(107)	"
35		+ 0 . 0		ADD(108)	"
36		+ 0 . 0		ADD(109)	"
37		+ 0 . 0		ADD(110)	"
38		+ 0 . 0		ADD(111)	"
39		+ 0 . 0		ADD(112)	"
40		+ 0 . 0		ADD(113)	"
41		+ 0 . 0		ADD(114)	"
42		+ 0 . 0		ADD(115)	"
43		+ 0 . 0		ADD(116)	"

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Space Division  
Rockwell International

FORTRAN      FIXED      10      DIGIT DECIMAL DATA

DECK NO.	PROGRAMMER	DATE	PAGE 14 of 16	JOB NO.
NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH	
1	L 10.0	ADD(97) AT TRANSFER TO A TRANSFER SAVING STEAKS POINT PT(F)	"	PT.9 "
2	+ 0.0	ADD(18)	"	" PT.9 "
3	+ 0.0	ADD(99)	"	" PT.9 "
4	+ 0.0	ADD(100)	"	" PT.10 "
5	+ 0.0			
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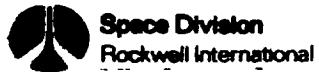


FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. \_\_\_\_\_ DATE PAGE 16 of 17 JOB NO. \_\_\_\_\_

DECK NO.	PROGRAMMER	NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
				TQE (1) RETRACT MOTION TORQUE LIMIT, 1ST POINT (F1-LBS)	
				TQE (2)	2
				TQE (3)	3
				TQE (4)	4
				TQE (5)	5
				TQE (6)	6
				TQE (7)	7
				TQE (8)	8
				TQE (9)	9
				TQE (10)	10
				TQK (11)	11
				TQK (12)	12
				TQE (13)	13
				TQE (14)	14
				TQE (15)	15

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DATE \_\_\_\_\_ PAGE 17 of 18

JOB NO. \_\_\_\_\_

PROGRAMMER

DECK NO.

NUMBER	IDENTIFICATION	DESCRIPTION	DO NOT KEY PUNCH
- R RPM = 0.0	RPM(1)	RETRACT MOTOR RATE LIMIT, 1ST POSITION	
+ 209.4	RPM(2)	"	
+ 418.8	RPM(3)	"	
+ 523.5	RPM(4)	"	
+ 628.2	RPM(5)	"	
+ 732.9	RPM(6)	"	
- R + 837.6	RPM(7)	"	
+ 942.3	RPM(8)	"	
+ 1047.	RPM(9)	"	
+ 1151.7	RPM(10)	"	
+ 1230.	RPM(11)	"	
+ 1230.	RPM(12)	"	
	RPM(13)	"	
	RPM(14)	"	
	RPM(15)	"	

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JOB NO. 2101  
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Rockwell International

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		T T B L 1 = 4 B H 2 , 3 = G U I D E H Y D R A U L I C S Y S T E M	A T T R E C A N C E C A R D L I N E T O U W I T H T H I S C A R D . L I N E T H I R D L I N E T O Y S P A C E S F O L L O W I N G H . D A T A I S U M M A O N L Y AT E N D .
		I P H A S E = 1 , 3 N = 5 0 , 9 I P C S = 3 , 9 I V E L I = 1 , 9 I S I M P L I = 1 , 9 , 7 , 3 I N = 8 , 9	T Y P E O F C O N T A C T , S / C O N T A C T , O N R A N K , = 3 C A T C H , N U M B E R O F V A C A B L E S I N T I C C H T E D A C T I V I T I E S A T M U V I C R E S = 1 , T R A N S I T = 2 , B O T H = 3 , A N N = 0 T Y P E C O N T R O L S Y S T E M , L M = 1 , S / I V N = 0 I F = 1 U S E S S I M P L I F I E D = C I N P U T S E C U R E E Q U A T I O N T O " N O . O F A T T E N V R Y P O I N T S "
		M P L O T = 2 7 , 9 N F I N G = 3 , 9 N A T T E N = 6 , 9 I G R A P H = 1 , 9	P L O T S & V A R Y I M P L O T - I N T E R A C T I O N S U N I T S O F F I N G E R S O N R I N G N U M B E R O F A T T E N U A T O R S P L O T S C A T I R = 1 ; N O P L O T S I F = 0 N O T U S E D
		I T A B L E = 1 , 9 I H = - 2 0 , 9 I X T C A = 3 , 9 I T S P G = 1 , 9 , J N Z = 1 , 5 , 9 J N S = 1 , 2 , 9	S E T = 10 I F B O U N D A R Y S E A R C H I S D E S I G N E D N U M B E R O F P O I N T S I N T A B L E A D C ( 8 ) / 1 0 0 ( 9 ) N U M B E R O F P O I N T S I N S P R I N G L O A D T A B L E : N U M B E R O F P O I N T S I N R E T U R N O F F I C E P A T C H T A B L E : N U M B E R O F P O I N T S I N T A B L E X S , A U G M A N T A R R A Y
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**EXAMPLE JOB REQUEST FORM**

**COMPUTER JOB SUBMITTAL**

<b>JOB NAME</b>		<b>MOUNT GO</b>		<b>DNY</b>	<b>18.0.01</b>	<b>16.461</b>	<b>4.0.7</b>	<input type="checkbox"/>																																																																								
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Lines: <b>392</b> Frames: <b>60</b> (100'S) (10'S) TIME = <b>60</b> (Min) (Sec)																																																																																
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## OUTPUT DATA

The output data from this program are in two forms: (1) numerical printout of docking loads and motion and (2) cathode-ray tube (CRT) plotted docking loads and motion time histories. The following pages are an example of printed and plotted program output and are followed by definitions of each data symbol and its units.

The user has considerable responsibility in controlling program output as described in the description column of the input data sheets. Integration step size, output printing, and plotting intervals, as well as the various program stop times, can all be specified in the input data by the user and will materially affect solution accuracy, output volume, computer run time, and resulting cost. A long run time and a small print interval will get you 50 to 100 pounds of printout paper, most of which you will not want.

Normal printed output for each case will look like the example: six pages of printed input data, and two pages at each time point during the run. The CRT data output will be approximately 50 pages of plotted time histories. If certain parameters remain zero throughout the run, their plots will not be included in the CRT.

### PRINTED OUTPUT DATA NOMENCLATURE DEFINITION

Name	Definition	Units
TIME	Current time during docking dynamics	sec
CASE	Case number, i.e., .60000000E01 = Case 6	N/A
XADD	Acceleration vector of CSM WRT inertial frame	ft/sec <sup>2</sup>
YADD		
ZADD		
XTDD	Acceleration vector of Soyuz WRT inertial frame	ft/sec <sup>2</sup>
YTDD		
ZTDD		
XAD	Velocity vector of CSM WRT inertial frame	ft/sec
YAD		
ZAD		
XTD	Velocity vector of Soyuz WRT inertial frame	ft/sec
YTD		
ZTD		

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<u>Name</u>	<u>Definition</u>	<u>Units</u>
XA	Position vector of CSM C.G. WRT inertial frame	ft
YA		
ZA		
XT	Position vector of Soyuz C.G. WRT inertial	ft
YT	frame	
ZT		
OXA	Angular rate of CSM about its body axis	deg/sec
OYA		
OZA		
OXT	Angular rate of Soyuz about its body axis	deg/sec
OYT		
OZT		
PHAD	Angular Euler rate of CSM	deg/sec
THAD		
PSAD		
PHTD	Angular Euler rate of Soyuz	deg/sec
THTD		
PSTD		
PHA	Euler angles of CSM	deg
THA		
PSA		
PHT	Euler angles of Soyuz vehicle	deg
THT		
PST		
FSAX	Force vector acting on CSM	lb
FSAY	Referred to CSM body coordinate system	
FSAZ		
FSTX	Force vector acting on Soyuz	lb
FSTY	Referred to Soyuz body coordinate system	
FSTZ		
TSXA	Torque vector acting on CSM	ft-lb
TSYA	Referred to CSM body coordinate system	
TSZA		
TSXT	Torque vector acting on Soyuz	ft-lb
TSYT	Referred to Soyuz body coordinate system	
TSZT		



<u>Name</u>	<u>Definition</u>	<u>Units</u>
FRX	Force vector acting on ring Referred to ring coordinate system	lb
FRY		
FRZ		
TRX	Torque vector acting on ring Referred to ring coordinate system	ft-lb
TRY		
TRZ		
XRDD	Vector acceleration of ring Referred to inertial coordinate system	ft/sec <sup>2</sup>
YRDD		
ZRDD		
ANXR	Angular rate vector of ring Referred to ring coordinate system	deg/sec
ANYR		
ANZR		
XRD	Velocity vector of ring Referred to inertial coordinate system	ft/sec
YRD		
ZRD		
PHRD	Euler rate of ring	deg/sec
THRD		
PSRD		
XR	Position vector of ring Referred to inertial coordinate system	ft
YR		
ZR		
PHR	Euler angle of ring	deg
THR		
PSR		
FCAX	Attitude control force vector of CSM Referred to CSM body coordinate system	lb
FCAY		
FCAZ		
FCTX	Attitude control force vector of Soyuz Referred to Soyuz body coordinate system	lb
FCTY		
FCTZ		
TCAX	Attitude control torque vector of CSM Referred to CSM body coordinate system	ft-lb
TCAY		
TCAZ		
TCTZ	Attitude control torque vector of Soyuz Referred to Soyuz body coordinate system	ft-lb
TCTY		
TCTZ		



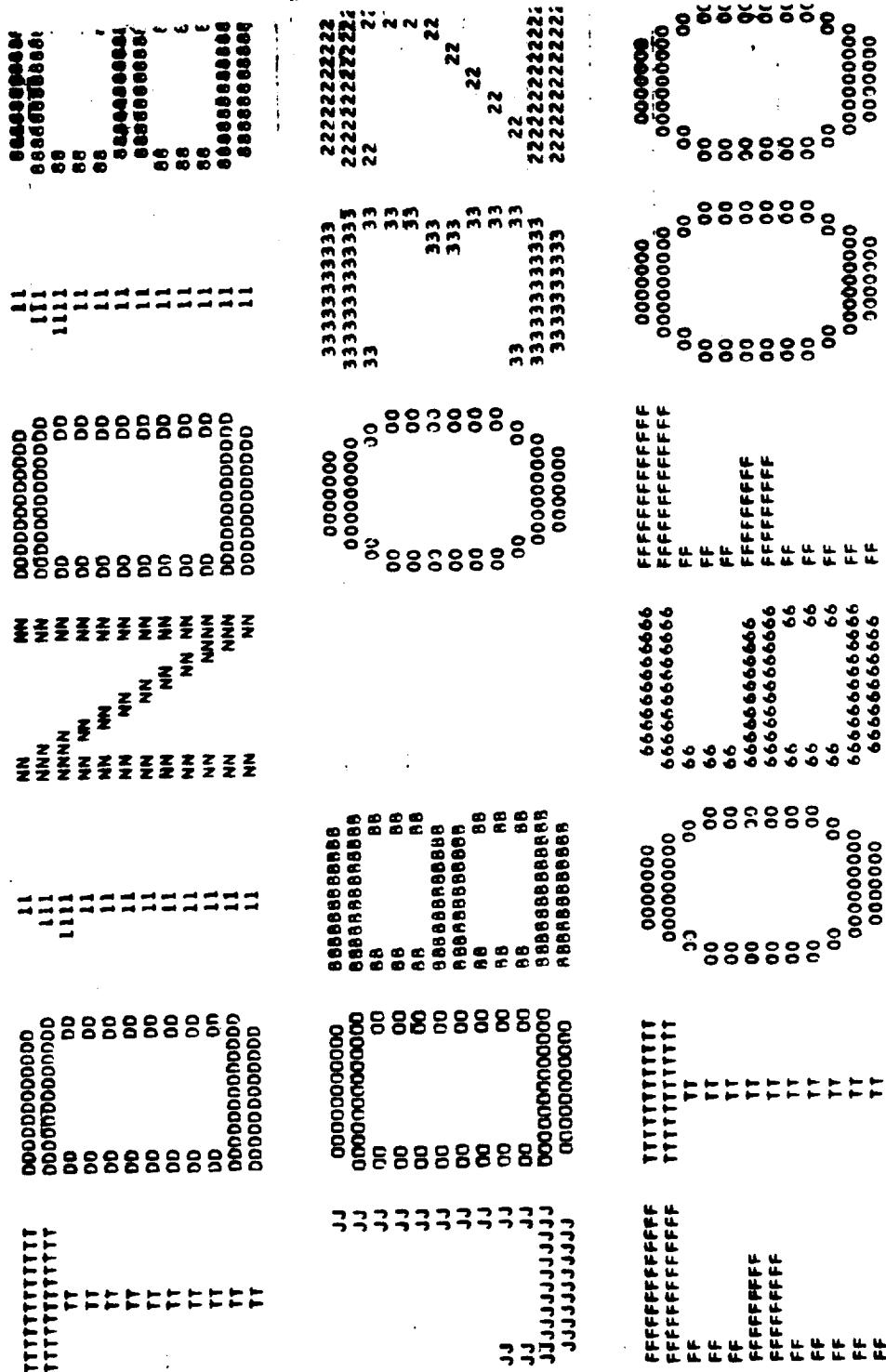
<u>Name</u>	<u>Definition</u>	<u>Units</u>
RWRTA1	Position vector of geometric center of ring with respect to geometric center of attenuator attach plane	ft
RWRTA2		
RWRTA3		
RWRRT1	Position vector of geometric center of ring with respect to geometric center of mating ring on Soyuz referred to Soyuz body coordinate system	ft
RWRRT2		
RWRRT3		
VWRTA1	Velocity vector of geometric center of ring with respect to CSM coordinate system	ft-sec
VWRTA2		
VWRTA3		
VWRRT1	Velocity vector of geometric center of ring with respect to Soyuz coordinate system	ft-sec
VWRRT2		
VWRRT3		
AWRTA1	Euler attitude of ring with respect to CSM	deg
AWRTA2		
AWRTA3		
AWRRT1	Euler attitude of ring with respect to Soyuz	deg
AWRRT2		
AWRRT3		
OWRTA1	Angular rate of ring with respect to CSM	deg-sec
OWRTA2		
OWRTA3		
OWRRT1	Angular rate of ring with respect to Soyuz	deg-sec
OWRRT2		
OWRRT3		
ATTNX(I)	X-Y-Z components of vector length of six attenuators with respect to active body coordinate system	ft
ATTNY(I)		
ATTNZ(I)		
ATTN(I)	Absolute length of the six attenuators	
STR(I)	Axial stroke of attenuators (+compressive)	ft
ATTND(I)	Attenuator stroking velocity (+compressive)	ft-sec
FA(I)	Axial force in attenuators (+compressive)	lb
FINGER-R	Distance from ring base along guide edge to point of load application - CSM side	ft
FFTXX	Guide force components, guide-axis system on Soyuz	lb
FFTYY		
FFTZZ		



<u>Name</u>	<u>Definition</u>	<u>Units</u>
FFRZ FFRY FFRZ	Guide force components, ring axis system on CSM	lb
DIS-1	Distance to contact normal to CSM system guide edge, (-) is in contact	ft
FINGER-T	Distance from ring base along guide edge to point of load application - Soyuz side	ft
ANGLE-R	Angle from +Y Axis to point of contact around the CSM system ring	deg
RFTX RFTY RFTZ	Ring force on Soyuz guide, guide axis system on Soyuz	lb
RFRX RFRY RFRZ	Ring force on CSM ring, in ring axis system	lb
DIS-2	Distance to contact normal to CSM ring edge (-) is in contact	ft
ANGLE-T	Angle from +Y axis to point of contact around the Soyuz ring	deg
FINGER-A	Distance from ring base along guide edge to point of load application - CSM side	ft
FRTX FRTY FRTZ	Force on Soyuz ring, in the Soyuz axis system	lb
FRRX FRRY FRRZ	Force on CSM guides, in the axis system of the CSM ring	lb
FRRX1 FRRX2 FRRX3 FRRX4 FRRX5 FRRX6	Force on the Soyuz ring surface number 1, 2, 3, etc. in compression (-)	lb
DIS-3	Distance to contact normal to the CSM guide edge (-) is in contact	ft



<u>Name</u>	<u>Definition</u>	<u>Units</u>
DELTAL	(-) distance capture latch would penetrate latching surface if not loaded, (+) no contact	ft
LATCHL	(-) distance along 45-degree latching surface (+) no contact	ft
LATCH LOADS BEARING	Capture latch loads in bearing on a surface that is 45-degree off the target vehicle X axis between target guides	lb
FRR, TRR	Guide ring loads, ring-to-ring contact	lb



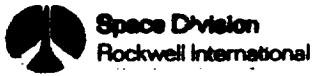
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- 69 -

SD 74-CS-0023



OUTPUT -0.1000E+01 -0.9998E-74 0.1071E+01 0.2303E-68  
OUTPUT -0.2000E+01 -0.1000E+01 0.1741E+01 0.1071E+01  
OUTPUT 0.5978E+00 -0.2000E+01 -0.9142E-01 0.1741E+01  
OUTPUT 0.4682E+00 0.5978E+00 0.4044E-03 -0.9142E-01



ADD - ARRAY \* \* \* \*

\*\*\*\*\* INITIAL CONDITIONS \*\*\*\*\*  
CASE NO.2. ORBITER DOCKING. ASTP SYSTEM

ACTIVE VEHICLE

ONEGX <sub>A</sub>	-0.69476022E-10	PHA	0.0	ONEGY <sub>A</sub>	-0.99999982E+00	TMA	0.49999981E+01
ONEGZ <sub>A</sub>	0.31517163E-06	PSA	-0.15698924E-05	XAD	0.50000000E+00	XA	-0.24525162E+02
YAD	-0.31397882E-07	YA	-0.16599935E+00	ZAD	-0.10300002E+00	ZA	-2.7386261E+02
XMA	0.73700000E+04	XXIA	0.68650000E+07	YYIA	0.67380000E+07	YIA	0.8560000F+06
XYIA	0.99999993E-03	XZIA	-0.25199997E+00	YZIA	0.20000001E-02	OFFJA	0.83000004E-01
OFFKA	0.37800003E+02	RA	0.94700903E+01				

TARGET VEHICLE

ONEGX <sub>T</sub>	0.0	PMT	0.0	ONEGY <sub>T</sub>	0.0	TMT	0.0
ONEGZ <sub>T</sub>	0.0	PST	3.0	XMT	0.73700000E+04	XXT	0.68650000E+07
XYT	0.67380000E+07	Z2T	0.85600000E+06	YYT	0.9999993E-03	X2T	-0.25199997E+00
YT <sub>T</sub>	0.20000001E-02	OFFJT	-0.83000004E-01	OFFKT	-0.37800003E+02	RT	-0.94700003E+01

C-ARRAY/ ATTENUATOR DATA

NO ATTENUATORS = 6

0.000003E-78	0.239000E+01	0.274000E+01	-0.300000E+02	0.100000E+01	0.0
0.300000E+02	-0.650000E+01	0.978000E+05	0.176700E+01	0.780000E-03	0.0
0.0	0.0	0.0	0.125000E+02	0.0	J.391000E+00
0.900000E+02	3.501100E+00	0.0	0.100000E-01	0.0	0.213500E+01
0.120000E+00	0.122797E+01	0.449500E-01	0.883700E-04	0.122718E+01	0.196350E+00
0.0	0.0	0.0	0.0	0.0	0.0
2.0	3.0	3.0	0.900000E+02	0.500000E+01	0.900000E+02
-0.100000E+00	0.0	-0.100000E+01	0.900000E+02	0.000001E-78	0.0
0.0	0.0	3.192733E+01			





D - ARRAY

0.786921E+00	0.377703E-06	-0.508360F+00	0.0	0.0	0.750000E+01
0.750000E+01	0.750000E+01	0.0	0.0	0.0	0.0
J.0	-J.723720E+76	J.5	0.196700E+00	-0.111700E+00	0.234000E+06
0.100000E+03	-0.358000E+00	0.254000E+01	0.254000E+01	0.100000E+01	0.600000E+00
0.656000E+04	0.273000E-03	0.0	0.0	0.0	0.0
-0.600000E+02	0.0	0.599999E+02	0.120000E+03	0.180000E+03	0.240000E+03
-0.834999E+02	0.235000E+02	0.365000E+02	0.143500E+03	0.156500E+03	0.263500E+03
0.119570E+01	J.239000F+01	0.119500E+01	-0.119500E+01	-0.239000E+01	-0.119500E+01
-0.206980E+01	0.0	0.206980E+01	0.206980E+01	0.605922E-05	-0.206980E+01
0.310182E+00	J.251274E+11	J.222257E+01	-0.222257E+01	-0.251274E+01	-0.310181E+00
-0.272239E+01	0.109257E+01	0.162982E+01	0.162982E+01	0.109257E+01	-0.272239E+01

#### PROGRAM COMMANDS

I	STOP	J.00000000E+31	DELPP	0.0	CASE
IPHASE	1	0.19999999E+00	DESLC	0.72727241E-02	JN
IGRAPH	15				
MPLOT					

#### INTEGRATION DATA

TMESS	0.29999999E-03	N	J.99999997E-05	A3	0.0	A5	0.10000002E-01
KAI	0	A2	0.99999993E-03	A6	0.29999996E-03	A7	0.19999995E+00
A2A	0.50000000E-03	A4A					



REACTION CONTROL SYSTEM

ACTIVE CONTROL SYSTEM

	PHCOMA	PSCOMA	ARXA	0.699999999E+00
THCOMAT	0.0	-0.15698934E-03	ADTHA	0.10000000E+01
ARYA	0.699999999E+00	ADPHA	BRA	0.22999998E-01
ADPSA	0.10000000E+01	FPA	0.90000000E+03	
DBANZA	0.43000001E+00	DBANZA	0.43000001E+00	
DBANYA	0.699999999E+00	BANYA	0.699999999E+00	
REACTA	0.50000000E+00	YMAXA	3.10000000E+02	
IR	0.50000000E+00		PMAXA	0.10000000E+02
REACTIA	0.50000000E+00			

TARGET CONTROL SYSTEM

	NOTZ	FIRET	BRT	0.229999998E-01
RADTV	0.0	0.90000000E+03	ADPHT	0.10000000E+01
AIXT	0.699999999E+00	ARZT	0.699999999E+00	
ADPTT	0.10000000E+01	DBANXT	0.430000001E+00	
DBANZT	0.43000001E+00	PHCOMT	0.0	
REACTT	0.50000000E+00	BANYT	0.0	
DQI	0.0	D03	0.0	
YMAXT	3.10000000E+02	PMAXT	0.10000000E+02	
IVEH	0.10000000E+02	REACTT	0.10000000E+03	
				3



SIMPLIFIED INITIAL CONDITIONS					
TRANS	THTOT	TMEL	VELLAT	VAXIAL	
0.91900000E+02	0.50000000E+01	0.90000000E+02	-0.10000000E+00		
0.0	-0.10000000E+01	0.90000000E+02	0.50000000E+00		
0.50000000E+00	0.89999969E+02				

STROKE VS AREA TABLE

-0.10000000E+01	0.314300001E+00
0.0	0.314300001E+00
0.-26999999E+01	0.-19230022E-01
0.35000000E+01	0.34300000E-02
0.+40000000E+01	0.16449999E-02
0.-43000022E+01	0.-10830001E-02
0.+45000000E+01	0.69999999E-03
0.12000000E+02	0.69999999E-03

ATTENUATOR SPRING LOAD TABLE

1.0	0.0
0.10319999E-02	0.22500000E+02
0.44799999E+00	0.31500000E+02
0.-67600000E+03	0.-30250000E+03
0.69999999E+00	0.33250000E+03
0.75000000E+00	0.16000000E+05

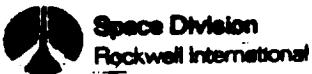
RETURN ORIFICE AREA TABLE

-0.10000000E+01	0.19999999E-02
0.0	0.19999999E-02
0.93699999E+00	0.19999999E-02
0.-10000000E+01	0.19999999E-02
0.12000000E+02	0.19999999E-02

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\*\* PRELATCH FINGER CONTACT



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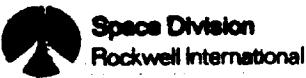
TIME 0.0          PHASE 1
XADD 0.249409E-12 YADD 0.300534E-14 ZADD 0.142439E-12 XL 0.0
XADD 0.313979E-07 YAD -0.313979E-07 ZAD -0.100000E+00 XID 0.0
XAD 0.500000E+00 YAD -0.165993E+00 ZAD 0.100000E+00 XID 0.0
XA  -0.245252E+02 YA  -0.165993E+00 ZA  -0.738863E+02 XT 0.0
XA  -0.694765E-10 DYX -7.100000E+01 DZA 0.31172E-06 OXT 0.0
OXA -0.694765E-10 DYX -7.100000E+01 DZA 0.31172E-06 PHTD 0.0
OXA -0.275044E-07 THAD -0.100000E+01 PSAD 0.316375E-06 PHTD 0.0
PHAD 0.0           THA  0.500000E+01 PSA  -0.156989E-05 PHT 0.0
PHAD 0.0           THA  0.500000E+01 PSA  -0.156989E-05 PHT 0.0
FSAX 0.173966E-08 FSAY 2.221472E-10 FSAZ 0.1220598E-08 FSTX 0.0
TSX 0.259459E-09 TSYA 0.0           TSZL 0.0           TSXT 0.0
FRX 0.173966E-09 FRY 0.221472E-10 FRZL 0.120598E-08 FRX 0.477609E-09 TRY 0.190792E-08 TRZL 0.708813E-08
YRDX 0.113886E-09 YRD 0.137219E-11 YRD 0.650414E-10 ANXR 0.694765E-10 ANYR 0.100000E+01 ANZR 0.315172E-08
XRD 0.140413E+00 YRD 0.469853E-07 ZRD 0.149645E+00 PHRD 0.275044E-07 THRD 0.100000E+01 PSRD 0.316375E-08
XR  -0.102216E+02 YR  -0.828997E-01 ZR  -0.371933E+02 PHR 0.0           THR 0.500000E+01 PSR  -0.156989E-08
FCAX 0.3           FCAY 0.3           FCAZ 0.0           FCZL 0.0           FCTX 0.0           FCTY 0.0           FCTZ 0.0
TCAY 0.0           TCAY 0.182520E+00 TCAZ 0.149402E+03 TCZL 0.0           TCTX 0.0           TCTY 0.0           TCTZ 0.0
WVRTAI 0.158297682E+01 WVRTA2 -0.59604645E-07 WVRTA3 -0.30511578E-04
WVRTI  -0.68739705E+00 WVRTT2 0.23841058E-06 WVRTT3 0.60112000E+00
WVRTAI  -0.41723251E-06 WVRTA2 0.0           WVRTA3 0.35762167E-06
WVRTI  -0.14031934E+00 WVRTT2 0.47336837E-07 WVRTT3 0.15076500E+00
WVRTAI 0.0           WVRTA2 0.7           WVRTA3 0.0           WVRTT2 0.49999914E+01 WVRTT3 -0.15698924E-05
WVRTI 0.0           WVRTA2 0.0           WVRTA3 -0.2035549E-12
GVRTAI 0.496946164E-16 GVRTT2 0.0           GVRTT3 0.313979E-06
GVRTI -3.12722218E-13 GVRTT2 -0.39999982E+00 GVRTT3 0.1582978E+01
OMRTI 0.15829778E+01 0.15829778E+01 0.15829778E+01 0.15829778E+01 0.15829778E+01 0.15829778E+01
OMRTX(1) 0.15829778E+01 0.15829778E+01 0.15829778E+01 0.15829778E+01 0.15829778E+01 0.15829778E+01
ATTNX(1) -0.86482005E+00 0.12274366E+00 0.1007564E+01 -0.1007564E+01 -0.1007564E+01 -0.12274366E+00
ATTN(2)(1) -0.65260035E+00 0.10925955E+01 -0.4400005E+00 -0.4400005E+00 0.10925955E+00 0.6526012E+00
ATTN(1)(1) 0.19273335E+01 0.19273335E+01 0.19273335E+01 0.19273335E+01 0.19273335E+01 0.1927334E+01
STALL(1) 0.0           0.0           0.0           0.0           0.0           0.0
ATTND(1) 0.2055063E-06 -0.8069026E-07 0.2599677E-06 0.2599677E-06 -0.6842039E-07 0.2858063E-06
FALL(1) 0.3381779E-11 -0.1235300E-08 0.2797968E-11 0.0           -0.8889607E-09 0.0
***** CONTACT BETWEEN RING FINGERS AND TARGET FINGERS
FINGER-R 0.0           0.0           0.0           0.0           0.0           0.0
FORCE-FFT X 0.0           0.0           0.0           0.0           0.0           0.0
FORCE-FFRX 0.0           0.0           0.0           0.0           0.0           0.0
FORCE-FFTY 0.0           0.0           0.0           0.0           0.0           0.0
FORCE-FFRY 0.0           0.0           0.0           0.0           0.0           0.0
FORCE-FFTZ 0.0           0.0           0.0           0.0           0.0           0.0
FORCE-FFRZ 0.0           0.0           0.0           0.0           0.0           0.0
DIS-1   J.3853999E+00 0.3954001E+00 0.8963107E+00 0.1169568E+00 0.1169568E+00 0.0
FINGER-T 0.0           0.0           0.0           0.0           0.0           0.0
***** CONTACT BETWEEN RING AND TARGET FINGERS
ANGLE-R 0.0           0.0           0.0           0.0           0.0           0.0

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FINGER-T	0.0	0.0	0.0	0.0	0.0
FORCE-FFTX	0.0	0.3	0.3	0.0	0.0
FORCE-FRX	0.0	0.0	0.0	0.0	0.0
FORCE-FFTY	0.0	0.0	0.0	0.0	0.0
FORCE-FRAY	0.0	0.0	0.0	0.0	0.0
FORCE-FPTZ	0.0	0.0	0.0	0.0	0.0
FORCE-FRZ	0.0	0.0	0.0	0.0	0.0
DTS-2	0.1059511E+01	0.7481057E+01	0.71481057E+01	0.1059513E+01	0.5378723E+03
eeee CONTACT BETWEEN FINGERS ON RING AND TARGET RING					
ANGLE-T	0.0	0.0	0.0	0.0	0.0
FINGER-A	0.0	0.0	0.0	0.0	0.0
FORCE-FATX	0.0	0.0	0.0	0.0	0.0
FORCE-FRX	0.0	0.0	0.0	0.0	0.0
FORCE-FFTY	0.0	0.0	0.0	0.0	0.0
FORCE-FRAY	0.0	0.0	0.0	0.0	0.0
FORCE-FPTZ	0.0	0.0	0.0	0.0	0.0
FORCE-FRZ	0.0	0.0	0.0	0.0	0.0
FRRX1	0.0	0.5407391E+00	0.5407410E+00	0.8382673E+00	0.9790125E+00
DTS-3	0.3096571E+00	0.6303748E+00	0.6303695E+00	0.9790125E+00	0.8382692E+00
eeee LATCH DISTANCE AND FORCES					
DELTAL	0.3096571E+00	0.6303748E+00	0.6303695E+00		
LATCHL	0.1019331E+01	0.26661842E+00	0.26661881E+00		
LATCH LOADS					
BEARING	0.0	0.0	0.0		
INIT	0	0	0		
eeee INTERACTION FORCE ON RING EXCLUDING ATTENUATOR FORCE					
FRR,TMR	0.0	0.3	0.0	0.0	0.0
eee CURRENT MAX ATTENUATOR FORCES FOLLOWED BY MIN ATTENUATOR FORCES ****					
0.33817966E-11	0.0	0.27979685E-11	0.0	0.3	0.1
0.0	-0.1235303E-08	0.0	0.0	-0.888896068E-09	0.0
0.0	0.5934701E-01	0.2211734E+00	0.9891170E-01	0.0	0.2357339E+00
eeee TARGET FINGER DISTANCE FROM CSM STRUCTURE					
0.63397503E+00	0.60719166E+01	0.14097776E+01	0.39868069E+00	0.59062433E+01	0.24305954E+01
-0.23369721E+00	0.54667792E+01	-0.16877689E+01	0.0	0.0	0.0
TAI,TII	0.4776088E-09	-0.5242937E-07	-0.1034311E-09	0.3	0.3



TIME 0.200132E+00 PHASE 1 11 677 XL 0.0 THP1 0.0  
 XADD-0.934661E-02 YADD-0.305173E-04 ZADD-0.-444473E-02 X100 0.953810E-02 YTDD 0.267655E-04  
 XAD -0.1499273E+00 YAO -0.1858113E-05 ZAD -0.133216E+03 X10 0.355217E-03 YTID 0.998888E-06  
 XA -0.244251E+02 YA -0.165999E+00 ZA -0.739063E+02 XT 0.842884E-05 YT 0.324029E-07  
 OXA 0.143332E-05 OYA -0.691086E+00 OZA 0.202225F-02 OXF 0.688740E-06 OYT 0.590249E-03  
 PHAD 3.172324E-33 THAD-3.691286E+02 PSAO 3.232925E-32 PHD 0.688738E-06 THD 0.590249E-03  
 PHA 0.173584E-04 THA 0.483082E+01 PSA 0.-201016E-03 PHM 0.361576E-07 THT 0.-1.440063E-04  
 FSAX-0.-658797E+02 FSAY-0.224683E+00 FSAZ 0.384423E+02 FSTX 0.702958E+02 FSTY 0.197262E+00  
 TSXA 0.-519566E+01 TSYA 0.-217681E+34 TSZA 0.-326285E+31 TSXT 0.220360E+01 TSYT 0.-186378E+04  
 FRX 0.-101126E+01 FRV 0.-276350E-01 FRZ -0.287549E+02 TRX 0.106421E+00 TRY -0.-872339E+01 TRZ 0.-751476E-01  
 XRDD-0.-875300E-01 YRDN 0.-171317E-02 ZRDO-0.-178054E+01 ANXR 0.-246379E-02 ANYR-0.-626548E+00 ANAR-0.-125838E-02  
 XRD 0.-295072E-01 YRD 0.-378367E-33 ZRD 0.-152135E-31 PHRD 0.-235744E-32 THRD-0.-626548E+00 PSRD-0.-126328E-02  
 AR -0.-102307E+02 YR -0.-829667E-01 ZR -0.-371727E+02 PHR 0.-386412E-04 THR 0.-482856E+01 PSR 0.-158348E-03  
 FCAX 0.0 FCAY 0.0 FCAY 0.0 TCAY 0.182520E+36 TCAY 2.149422E+33 TCAY 0.0 TCTY 0.0  
 TCAX 0.0 TCAY 0.15823374E+01 RWRTA2 -0.57220459E-05 RWRTA3 -0.15411377E-02  
 PWRTA1 0.-69654846E+00 RWRTB2 0.-33497810E-04 RWRTB3 0.-62194824E+00  
 RWRTA1 -0.-21882415E-01 RWRTA2 -0.-75922790E-05 RWRTA3 -0.-58733943E-01  
 VWRTA1 0.-288218556E-01 VWRPT2 0.-37662266E-03 VWRPT3 0.-15698999E-01  
 VWRTA1 0.-24859241E-04 AWRTA2 -0.-226017923E-02 AWRTA3 -0.-42216795E-04  
 TWRTA1 0.-38604936E-04 AWRTB2 0.-48285637E+01 AWRTB3 0.-1589204E-03  
 QWRTA1 0.-24627715E-02 QWRTA2 0.-64538836E-01 QWRTA3 0.-32804557E-02  
 QWRTA1 0.-23501317E-02 QWRTB2 -0.-62595713E+00 QWRTB3 -0.-16703397E-02  
 ATTNX(1) 0.1582444F+01 0.15822794E+01 0.15822773E+01 0.1582271E+01 0.1582292E+01  
 ATTNY(1) -0.-8848236E+00 0.1227384E+00 0.1007558E+01 -0.-1007574E+01 -0.-1227488E+00  
 ATTNZ(1) -2.-6541119E+02 2.-1291146E+31 -2.-4411512E+03 -0.-4411512E+03 -0.-6541138E+00  
 ATTNL(1) 0.-1927408E+01 0.-1925902E+01 0.192094E+01 0.-1927101E+01 0.-1927405E+01  
 STRNL(1) -2.-8155587E-04 2.-1414623E-02 0.-2309916E-03 0.-2265801E-03 0.-1418108E-02  
 ATTND(1) 0.-8284510E-03 0.4966795E-01 0.-312280E-02 0.-3204724E-02 0.5001965E-01 0.-7480748E-03  
 FAIL1 -0.-5040209E+01 0.3502499E+02 0.1001182F+02 0.9879483E+01 0.3502519E+02 -0.-47692267E+01  
 \*\*\* CONTACT BETWEEN RING FINGERS AND TARGET FINGERS  
 FINGER-R 0.0 0.0 0.0 0.0 0.0 0.0  
 FINGER-T 0.0 0.0 0.0 0.0 0.0 0.0  
 FORCE-FFTX 0.0 0.0 0.0 0.0 0.0 0.0  
 FORCE-FFPX 0.0 0.0 0.0 0.0 0.0 0.0  
 FORCE-FFTY 1.1 1.1 0.0 0.0 0.0 0.0  
 FORCE-FFRY 0.0 0.0 0.0 0.0 0.0 0.0  
 FORCE-FFTZ 0.0 0.0 0.0 0.0 0.0 0.0  
 FORCE-FFRZ 2.1 2.1 0.0 0.0 0.0 0.0  
 DIS-1 0.-3793119E+00 0.-37931609E+00 0.-9186038E+00 0.1204597E+00 0.1204992E+00 0.9186298E+00  
 FINGER-T 0.0 0.0 0.0 0.0 0.0 0.0  
 \*\*\* CONTACT BETWEEN RING AND TARGET FINGERS  
 ANGLE-R 0.0 0.0 0.0 0.0 0.0 0.0



**INIT** **FRR** **TAI**

VARIABLE		MAXIMUM VALUE		AT TIME	MINIMUM VALUE	ALL TIME
		FT/SEC	FT/SEC			
XAD	FT/SEC	0.5000000E+00	0.0	0.4981481E+00	0.3242420E+00	
YAD	FT/SEC	-0.3139788E-07	0.0	-0.6379736E-05	0.3242420E+00	
ZAD	FT/SEC	-0.9988260E-01	0.1433451E+00	-0.1005763E+00	0.3242420E+00	
XTO	FT/SEC	0.1274545E-02	0.3242420E+00	0.0	0.0	
YTO	FT/SEC	0.5267813E-05	0.3242420E+00	0.0	0.0	
ZTO	FT/SEC	0.1114971E-02	0.3242420E+00	0.0	0.0	
XRD	FT/SEC	0.1230122E+00	0.3242420E+00	-0.1404133E+00	0.0	
YRD	FT/SEC	0.5661065E-03	0.29862539E-00	-0.4698527E-07	0.0	
ZRD	FT/SEC	0.1496453E+00	0.0	-0.1027970E+00	0.2833921E+00	
XA	FT	-0.2436324E+02	0.3242420E+00	-0.2452516E+02	0.0	
YA	FT	-0.1659994E+00	0.0	-0.1659999E+00	0.3202763E+00	
ZA	FT	-0.73886266E+32	0.0	-0.7391970E+02	0.3242420E+00	
XT	FT	0.11175433E-03	0.3242420E+00	0.0	0.0	
YT	FT	0.3806531E-06	0.3242420E+00	0.0	0.0	
ZT	FT	0.1028258E-03	0.3242420E+00	0.0	0.0	
XR	FT	-0.1022155E+02	0.0	-0.1023176E+02	0.1506282E+00	
YR	FT	-0.6291286E-01	0.3242420E+00	-0.829977E-01	0.0	
ZR	FT	-0.3717259E+32	0.2094209E+00	-0.3719328E+02	0.0	
OMEGXA	DEG/SEC	0.5700448E-05	0.3242420E+00	-0.6967602E-10	0.0	
OMEGYA	DEG/SEC	-0.5006242E+00	0.3242420E+00	-0.9999999E+00	0.0	
OMEGZA	DEG/SEC	0.3266442E-32	0.3242420E+00	0.3151716E-06	0.0	
OMEGXT	DEG/SEC	0.6307793E-05	0.3242420E+00	0.0	0.0	
OMEGCY	DEG/SEC	0.0	0.0	-0.2118043E-02	0.3242420E+00	
OMEGZT	DEG/SEC	0.2318664E-34	0.2833921E+00	-0.3663952E-96	0.1433451E+00	
OMEGXA	DEG/SEC	0.3623242F-02	0.2168096E+00	-0.1237685E-02	0.2463643E+00	
OMEGCY	DEG/SEC	-0.2775496E-01	0.260994E+00	-0.1032049E+01	0.143491E+00	
OMEGZT	DEG/SEC	0.7655579E-02	0.3242420E+00	-0.2533917E-02	0.3056847E+00	
PHA	DEG	0.4535296E-04	0.3242420E+00	0.0	0.0	
THA	DEG	0.4999999E+01	0.0	0.4756840E+01	0.3242420E+00	
PSA	DEG	0.5323325E-13	0.3242420E+00	-0.1569892E-05	0.0	
PHT	DEG	0.3421204E-06	0.3242420E+00	0.0	0.0	

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OF POOR QUALITY





THT	DEG	0.3	0.3242620E+00	
PST	DEG	0.2554549E-05	0.3242620E+00	
PHR	DEG	0.2102508E-03	0.3242620E+00	
THR	DEG	0.4999998E+01	0.3614572E-05	
PSA	DEG	0.2611426E-03	0.4785947E+31	
			0.3242620E+00	
			0.303399E-01	
FSUMMX	LBS	0.1739658E-08	-0.369184E+02	
FSUMAY	LBS	0.2214123E-13	0.2319869E+00	
FSUMAZ	LBS	0.1055739E+02	0.3242620E+00	
			0.3202763E+00	
FSUMTX	LBS	0.7298570E-02	0.2094209E+00	0.0
FSUMTY	LBS	0.4157556E+00	0.3232763E+00	0.0
FSUMTZ	LBS	0.6384851E+02	0.2094209E+00	0.0
			0.4260629E+02	
FSUMRX	LBS	0.3228963E+02	0.3033599E-01	-0.1739658E-08
FSUMRY	LBS	0.1367363E+03	0.2759612E+00	0.0
FSUMRZ	LBS	0.4914001E+01	0.2982539E+00	0.0
			0.2309756E+00	
			0.2315869E+00	
TSUMAX	FT LBS	0.1221591E+02	0.3242620E+00	-0.2594593E-09
TSUMAY	FT LBS	0.0	0.0	-0.3034125E+04
TSUMAZ	FT LBS	0.5966980E+01	0.2315869E+00	-0.466912E+00
			0.5822357E-01	
TSUMTX	FT LBS	0.1239796E+02	0.3202763E+00	-0.9299616E-01
TSUMTY	FT LBS	0.0	0.0	-0.1935094E+34
TSUMTZ	FT LBS	0.4100546E+01	0.2094209E+00	-0.1566190E+01
			0.3202763E+00	
TSUMRX	FT LBS	0.2223482E+00	0.3129805E+00	-0.1734160E+00
TSUMRY	FT LBS	0.1367798E+02	0.2168096E+00	-3.111984E+32
TSUMRZ	FT LBS	0.3202000E+00	0.3129805E+00	-0.1520557E+00
			0.2685303E+00	
			0.1433451E+00	
FORCE ATTEN 1	LBS	0.6818863E+01	0.3031599E-01	-0.4893895E+01
STROKE ATTEN 1	FT	0.1568974E-03	0.3031599E-01	-0.1115525E-03
VELOCITY ATTEN 1	FT/SEC	0.8215103E-02	0.22241983E+00	-0.7670127E-02
			0.2463643E+00	
FORCE ATTEN 2	LBS	0.3528505E+02	0.3242620E+00	-0.6070695E+01
STROKE ATTEN 2	FT	0.1366744E-01	0.3242620E+00	-0.9823123E-04
VELOCITY ATTEN 2	FT/SEC	0.1192064E+00	0.2759612F+00	-0.9522609E-02
			0.5822357E-01	
			0.4492798E-01	
FORCE ATTEN 3	LBS	0.1885298E+02	0.2241983E+00	-0.1648469E+01
STROKE ATTEN 3	FT	0.4323847E-03	0.2241983E+00	-0.2990279E-34
VELOCITY ATTEN 3	FT/SEC	0.1126248E-01	0.1433451E+00	-0.1518557E-01
			0.3056847E+00	
			0.2537529E+00	



FORCE ATTEN 4 LBS	0.1866668E+02	0.2241983E+00	-0.2172102E+01
STROKE ATTEN 4 FT	0.4281807E-03	0.2241983E+00	-0.3513998E-04
VELOCITY ATTEN 4 FT/SEC	0.1114860E-01	0.1433451E+00	-0.1528569E-01
FORCE ATTEN 5 LBS	0.35285545E+02	0.3242620E+00	-0.6010097E+01
STROKE ATTEN 5 FT	0.1369384E-01	0.3242620E+00	-0.9729061E-04
VELOCITY ATTEN 5 FT/SEC	0.1194025E+00	0.2759612E+00	-0.9430315E-02
FORCE ATTEN 6 LBS	0.6856735E+01	0.3033599E-01	-0.6756788E+01
STROKE ATTEN 6 FT	0.1576676E-03	0.3033599E-01	-0.109328E-03
VELOCITY ATTEN 6 FT/SEC	0.8140113E-02	0.2241983E+00	-0.7464390E-02
RWTTA X Y Z FT	0.1582978E+01 -0.5960664E-07 0.2593994E-33	0.0 0.0 0.5822357E-01	0.1577365E+01 -0.144232E-04 -0.169674E-01
AWRTA X Y Z DEG	0.1873120E-03 0.2910683E-01 0.2212597E-04	0.3242620E+00 0.3242620E+00 0.1433451E+00	-0.4981849E-05 -0.4292771E-02 -0.2927349E-03
VWRTA X Y Z FT/SEC	0.8210421E-02 0.3766998E-04 0.6716490E-02	0.4492798E-01 0.1116806E+00 0.3033599E-01	-0.4941684E-01 -0.1615873E-03 -0.1483641E+00
QWRTA X Y Z DEG/SEC	0.3622686E-02 0.5773004E+00 0.4371025E-02	0.2168096E+00 0.2610994E+00 0.3242620E+00	-0.1238710E-02 -0.2537137E+00 -0.5631998E-02
RWRTT X Y Z FT	-0.6873970E+00 0.8738041E-04 0.6220245E+00	0.0 0.3242620E+00 0.2094098E+00	-0.69758880E+00 0.2384186E-06 0.6011200E+00
AWRIT X Y Z DEG	0.2099082E-03 0.4999991E+01 0.2591594E-03	0.3242620E+00 0.0 0.3242620E+00	-0.3614566E-05 0.4786135E+01 -0.2691181E-05
VWRTT X Y Z FT/SEC	0.120593E+00 0.5611759E-03 0.1501650E+00	0.3242620E+00 0.2982539E+00 0.0	-0.1403154E+00 0.4733684E-07 -0.1031010E+00
QWRTT X Y Z DEG/SEC	0.3596319E-02 -0.2623852E-01 0.74488800E-02	0.2168096E+00 0.2610994E+00 0.3242620E+00	-0.109868E-02 -0.1032024E+01 -0.2522275E-02

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<b>FORCE --- TARGET FINGER-RING 4-6</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
0.5110207E+02	0.2094209E+00	0.0	0.0
0.5158023E+02	0.2094209E+00	0.0	0.0
<b>ACTIVE INTERFACE TORQUES, FT LBS</b>	<b>0.1751614E+00</b>	<b>0.2315869E+00</b>	<b>-0.2225294E+00</b>
0.3403076E+01	0.9299755E-01	-0.1378320E+03	0.2168096E+00
0.7061529E+00	0.2908230E+00	-0.9462715E-01	0.8220649E-01
<b>TARGET INTERFACE TORQUES, FT LBS</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
0.2191206E+03	0.2094209E+00	-0.3165951E+00	0.3202763E+00
0.0	0.0	-0.1059144E+01	0.3202763E+00
<b>TARGET FINGER INTERFERENCE DISTANCE</b>	<b>0.6471348E+03</b>	<b>0.1651945E+00</b>	<b>0.6339750E+00</b>
0.4086068E+00	0.1579114E+00	0.3986807E+00	0.0
-0.2319756E+00	0.9299755E-01	-0.2345877E+00	0.2094209E+00
<b>TMOTOR FT LBS</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>

GRAPHING TIME = 0.71899996E+01 SECONDS      KNT= 35



ASP JOB NO. = 0326      ID(DAY TIME) = (004 16.01.12)      DATE = 74-004

77YD1ND0184 JOB #MOUNT C 01 6964074138740123 201 004 3900605 1, 1

ELAPSED TIME ON MAIN = 1651      \* 012.85, START TIME = 20-07-34

DDNAME = SYSMSG PRINTED ON RM001PRI, LINES = 000164  
DDNAME = SYSUDUMP PRINTED ON RM001, LINES = 030000  
DDNAME = SYSPRINT PRINTED ON RM001PRI, LINES = 001297  
DDNAME = FTO6F00L PRINTED ON RM001PRI, LINES = 000607  
LINES OUTPUT FOR THIS JOB = 002768

NO CARD OUTPUT FOR THIS JOB.



PLOTTED OUTPUT DATA NOMENCLATURE

<u>Name</u>	<u>Definition</u>	<u>Page</u>
XAD YAD ZAD	Inertial velocity, active vehicle C.G., in the X, Y, and Z directions of the inertial frame	6
XTD YTD ZTD	Inertial velocity, target vehicle C.G., in the X, Y, and Z directions of the inertial frame	7
XRD YRD ZRD	Inertial velocity, guide ring C.G., in the X, Y, and Z directions of the inertial frame	8
XA YA ZA	Position of the active vehicle C.G. respect to the inertial frame located initially at the target vehicle C.G.	9
XT YT ZT	Position of the target vehicle C.G., with respect to the inertial frame located initially at the target vehicle C.G.	10
XR YR ZR	Position of the guide ring C.G., with respect to the inertial frame located initially at the target vehicle C.G.	11
OMEGXA OMEGYA OMEGZA	Angular rate of the active vehicle about its X, Y, and Z body axes	12
OMEGXT OMEGYT OMEGZT	Angular rate of the target vehicle about its X, Y, and Z body axes	13
OMEGXR OMEGYR OMEGZR	Angular rate of the guide ring about its X, Y, and Z body axes	14
PHA THA PSA	Euler angles of the active vehicle about the X, Y, and Z axes respectively, i.e., phi, theta, and psi	15
PHT THT PST	Euler angles of the target vehicle about the X, Y, and Z axes respectively	16
PHR THR PSR	Euler angles of the guide ring about the X, Y, and Z axes respectively	17
FSUMAX FSUMAY FSUMAZ	Total force at the active vehicle C.G in its X, Y, and Z body axes; includes RCS forces	18



<u>Name</u>	<u>Definition</u>	<u>Page</u>
FSUMTX FSUMTY FSUMTZ	Total forces at the target vehicle C.G. in its X, Y, and Z body axes; includes RCS forces	19
FSUMRX FSUMRY FSUMRZ	Total forces at the guide ring C.G. in its X, Y, and Z body axes	20
TSUMAX TSUMAY TSUMAZ	Total moments about the active vehicle C.G. in its X, Y, and Z body axes, includes RCS moments	21
TSUMTX TSUMTY TSUMTZ	Total moments about the target vehicle C.G. in its X, Y, and Z body axes, includes RCS moments	22
TSUMRX TSUMRY TSUMRZ	Total moments about the guide ring C.G. in its X, Y, and Z body axes	23
RCS FORCE & MOMENTS, ACTIVE VEHICLE	Time durations of active vehicle RCS forces and moments in its X, Y, and Z body axes	24
RCS FORCE & MOMENTS TARGET VEHICLE	Time duration of target vehicle RCS forces and moments in its X, Y, and Z body axes	25
FORCE ATTN 1 STROKE ATTN 1 VELOCITY ATTN 1	Axial force, stroke, and stroke rate of attenuator (shock absorber) No. 1	26
SAME FOR ATTENUATORS NO. 2 THROUGH NO. 6		27 - 31
RWTIA X Y Z	Guide ring position with respect to the active vehicle docking interface structural base center line	32
AWRTA X Y Z	Guide ring relative angle about the active vehicle interface base X, Y, and Z axes	33
VWRTA X Y Z	Guide ring relative velocity with respect to the active vehicle interface X, Y, and Z axes	34
OWRTA X Y Z	Guide ring relative angular rate about the active vehicle interface base X, Y, and Z axes	35



<u>Name</u>	<u>Definition</u>	<u>Page</u>
RWRRTT	Guide ring position with respect to the target vehicle docking interface structural base center line	36
AWRTT	Guide ring relative angle about the target vehicle interface base X, Y, and Z axes	37
VWRTT	Guide ring relative velocity with respect to the target vehicle interface X, Y, and Z axes	38
OWRTT	Guide ring relative angular rate about the target vehicle interface base X, Y, and Z axes	39
FORCE BETWEEN FINGERS 1/3	Normal force on the active guide edges 1 through 3	40
SAME FOR GUIDE EDGES 4 THROUGH 6		41
FORCE TARGET FINGERS/ RING 1/3	Normal force between target vehicle guide edges 1 through 3 on active vehicle guide ring	42
SAME FOR GUIDE EDGES 4 THROUGH 6		43
FORCE RING FINGER/TARGET 1/3	Normal force between active vehicle guide edges 1 through 3 on target vehicle guide ring	44
SAME FOR GUIDE EDGES 4 THROUGH 6		45
ACTIVE INTERFACE TORQUES	Docking moments about the active vehicle docking interface structural base X, Y, and Z axes RCS moments not included	46
TARGET INTERFACE TORQUES	Docking moments about the target vehicle docking interface structural base X, Y, and Z axes RCS moments not included	47
TARGET FINGER INTERFERENCE DISTANCE	Normal distance between target vehicle guides and some reference point on the active vehicle input by C(23) and C(24)	48



Name	Definition	Page
TMOTOR	Retract motor torque used to draw capture-latched vehicles together	49
FCABL1 FCABL2 FCABL3	Force in retract cables Nos. 1, 2, and 3 (not shown in example)	50



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SEND TO MOUNT MAIL STOP B1

DEPT-GROUP 888-107

41 ◇ X 74 ◇ 1 ◇

BOX NO. 888

DATE 74052

CRT CODES CUT MAG



0100740103  
022174 0001

\*\*\*\* INITIAL CONDITIONS \*\*\*\*  
CASE NO.29, ORBITER DOCKING, ASTP SYSTEM

ACTIVE VEHICLE

ONEGXIA	-0.38018770E-10	PVA	0.46999991E+01	ONEGYA	0.29889811E+00	TVA	-0.99999990E+01
ONEGZIA	-0.26146747E-01	PSA	0.16638709E-03	XAD	0.50000000E+00	XA	-0.17545101E+02
YAO	0.62795721E-07	YA	0.31267989E+01	ZAD	0.19899999E+00	ZA	-0.75790192E+02
XVA	0.73700000E+04	XXIA	0.68850000E+07	YYIA	0.67380000E+07	ZZIA	0.85600000E+06
XYIA	0.99999993E-03	XXIA	-0.25199997E+00	YZIA	0.20000001E-02	OFFJA	0.83000004E-01
OFFKA	0.37000007E+02	RA	0.94700003E+01				

TARGET VEHICLE

ONEGXIT	0.0	PMT	0.0	ONEGYT	0.0	TMT	0.0
ONEGZIT	0.0	PST	0.0	XPT	0.73700000E+07	XXIT	0.68850000E+07
YYIT	0.67380000E+07	ZZIT	0.68850000E+08	YYIT	0.99999993E-03	ZZIT	-0.25199997E+00
YZIT	0.20000001E-02	OFFJT	-0.83000004E-01	OFFXT	-0.37000003E+02	RT	-0.94700003E+01

C-ARRAY/ ATTENUATOR DATA

NO ATTENATORS = 8

0.800003E-78	0.239000E+01	0.274000E+01	-0.300000E+02	0.100000E+01	0.333000E-02	0.300000E+02	-0.650000E+01
0.878000E+05	0.176700E+01	0.780000E-03	0.0	0.0	0.0	0.0	0.125000E+02
0.0	0.301000E+00	0.300000E+02	0.750000E+00	0.0	0.100000E+01	0.0	0.213500E+01
0.120000E+00	0.1227977E+01	0.449500E-01	0.983000E-01	0.1227100E+01	0.193300E+00	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.900000E+02
-0.600000E+01	0.800000E+02	0.200000E+00	0.0	0.300000E+00	0.900000E+02	0.000001E-78	0.0
0.0	0.0						

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SD 74-CS-002

0 - ARRAY

0.023498E+00	-0.113833E+00	-0.082733E+00	0.0	0.0	0.750000E+01	0.750000E+01	0.750000E+01
0.0	0.0	0.0	0.0	0.0	-0.723788E+75	0.0	0.100000E+00
-0.111700E+00	0.234000E+00	0.100000E+01	-0.308000E+00	0.254000E+01	0.254000E+01	0.100000E+01	0.000000E+00
0.056000E+01	0.273000E-03	0.0	0.0	0.0	0.0	0.0	0.0

PROGRAM COMMANDS

I PHASE	1	STOP	0.10000000E+02	DELPP	0.0	CASE	0.0
I GRAPH	1	DELP	0.10000000E+01	DESLC	0.99999954E-01	JN	0
NPLOT	15						



1987-0103  
022174 0003

CASE NO.29. ORBITER DOCKING. ASTP SYSTEM

INTEGRATION DATA

THE3H	0.2300000E-03	H	0	A3	0.0	A5	0.1000000E-01
KAI	0	A2	0.9300000E-05	A4	0.2300000E-03	A7	0.1999999E+00
ASA	0.5000000E-03	ANA	0.1000000E-01				

REACTION CONTROL SYSTEM

ACTIVE CONTROL SYSTEM

WCOMA	-0.6000000E+01	WCOMA	0.5000000E+01	WCOMA	0.1000071E-05	ARCA	0.8999999E+00
ARYA	0.8000000E+00	ARYA	0.6000000E+00	ADPHIA	0.1000000E+01	ADTHA	0.1000000E+01
ADPSA	0.1000000E+01	RDA	0.0	FRA	0.5000000E+03	BRA	0.2299999E-01
BRANZA	0.4200000E+00	BRANZA	0.4300000E+00	BRANZA	0.4300000E+00	TMA	0.1000000E+01
REACTA	0.5000000E+00	BANZA	0.5000000E+00	BANZA	0.5000000E+00	BANZA	0.8999999E+00
DR	0	BNAXA	0.1000000E+02	BNAXA	0.1000000E+02	BNAXA	0.1000000E+02
REACTIA	0.1000000E+04						

TARGET CONTROL SYSTEM

BDOTY	0.0	BDTZ	0.0	FIRET	0.1000000E+03	BT	0.2299999E-01
ARFT	0.6000000E+00	ARYT	0.6000000E+00	ARZT	0.6000000E+00	ADPHT	0.1000000E+01
ADPTY	0.1000000E+01	ADPT	0.1000000E+01	DBANT	0.4300000E+00	DBANTT	0.4300000E+00
DBANTZ	0.7300000E+00	TDONT	0.0	FDCNT	0.0	FDCNT	0.0
REACTT	0.4000000E+02	BANIT	0.6000000E+00	BANIT	0.6000000E+00	BANIT	0.6000000E+00
Q01	0.0	D02	0.0	D03	0.0	TNT	0.1000000E+01
BNAXT	0.1000000E+02	BNAXT	0.1000000E+02	BNAXT	0.1000000E+02	INCS	3
IVDI	1	REACTT	0.4000000E+03				



0000740107  
002170 0004

CASE NO.20, ORBITER DOCKING, ASTP SYSTEM

SIMPLIFIED INITIAL CONDITIONS

TWANG	6.0000000E+02	TWTOT	-6.0000000E+01	TVEL	6.9800000E+02	VELLAT	6.1999999E+00
ONEOR	0.0	ONEGT	6.3000001E+00	THOMEQ	6.9800000E+02	VAXIAL	6.5000000E+00
XMISS	6.7500000E+00	THDRO	6.0299999E+02				

STROKE VS AREA TABLES

-6.1000000E+01	6.31400001E+00
0.0	6.31400001E+00
6.2000000E+01	6.18000002E-01
6.3500000E+01	6.37000000E-02
6.4000000E+01	6.18499995E-02
6.43000002E+01	6.10000001E-02
6.4500000E+01	6.09999998E-03
6.42000000E+02	6.00000000E-03



2100740163  
022174 0005

CASE NO.29, ORBITER DOCKING, ASTP SYSTEM

\*\*\*\*\* ADD - ARRAY \*\*\*\*\*

0.100000E+02	0.0	0.0	0.161400E+02	0.430000E+02	0.244000E+02	0.244000E+02	0.800000E-78
0.109723E+01	0.212300E+01	0.874000E-01	0.0	0.0	0.907570E+00	0.412000E+01	0.0
0.110000E+01	0.210000E+05	-0.999940E-07	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.119990E+05	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.100000E+01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.000002E-78	0.325000E+00	0.234000E+01
0.0	0.100000E+03	0.700000E-02	0.700000E-02	0.0	0.0	0.0	0.0
0.0	0.400000E+02	0.320000E+05	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.100000E-02	0.999999E+00	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ORIGINAL PAGE IS  
OF POOR QUALITY

← -2 →



DOCKING DYNAMICS - CASE NO. = 29, ORBITER DOCKING, ASTP SYSTEM

9100740103  
022174 0006

METER/SEC

.1524

.1371

.1219

.1066

.0914

.0762

TIME - SECONDS



METER/SEC

.00457

.00304

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.00152

TIME - SECONDS



METER/SEC

.0549

.0457

.0304

.0152

.0000

TIME - SECONDS



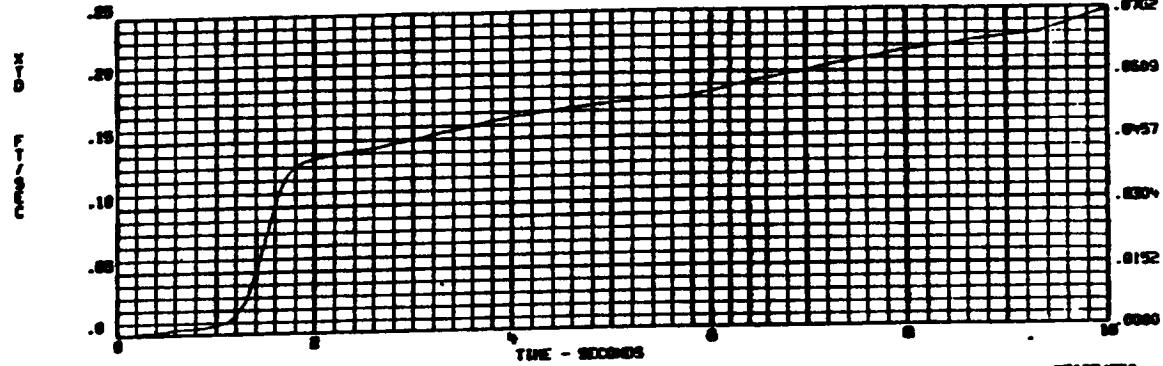
Space Division  
Rockwell International

DOCKING DYNAMICS - CASE NO. - 28. ORBITER DOCKING, AWP SYSTEM

91007/00103  
022174 0007

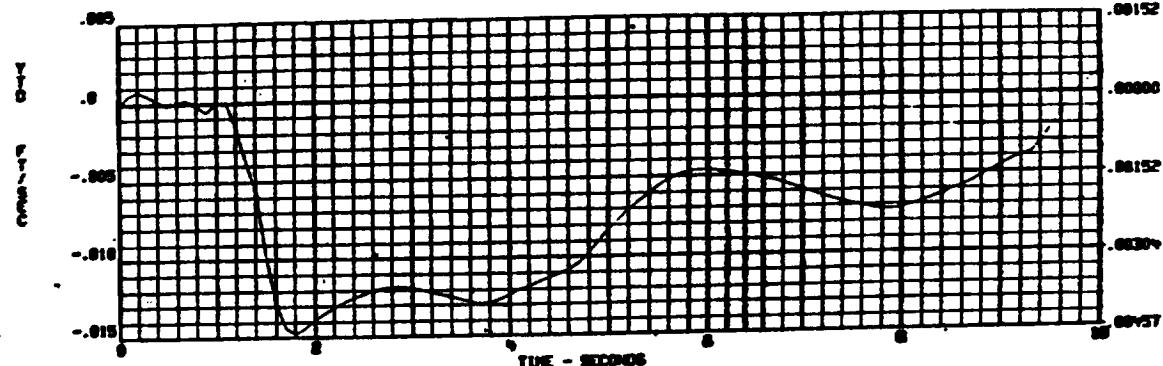
METER/SEC

.0702



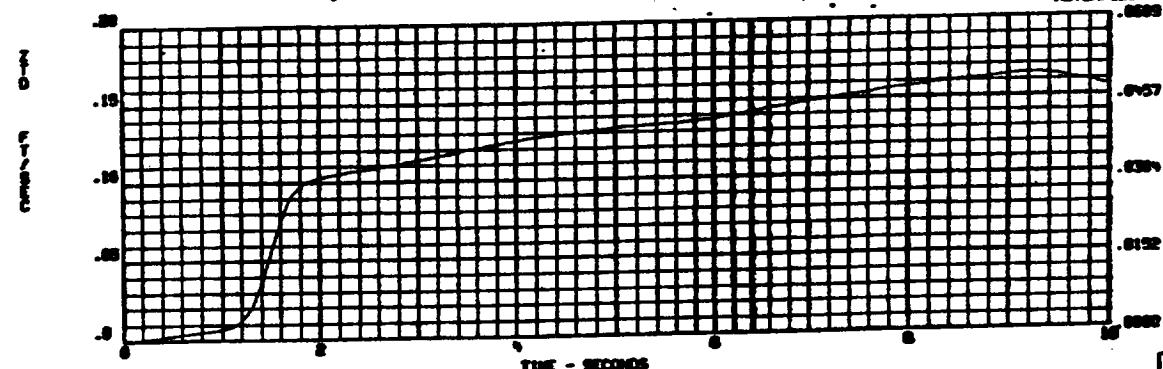
METER/SEC

.00152



METER/SEC

.0000

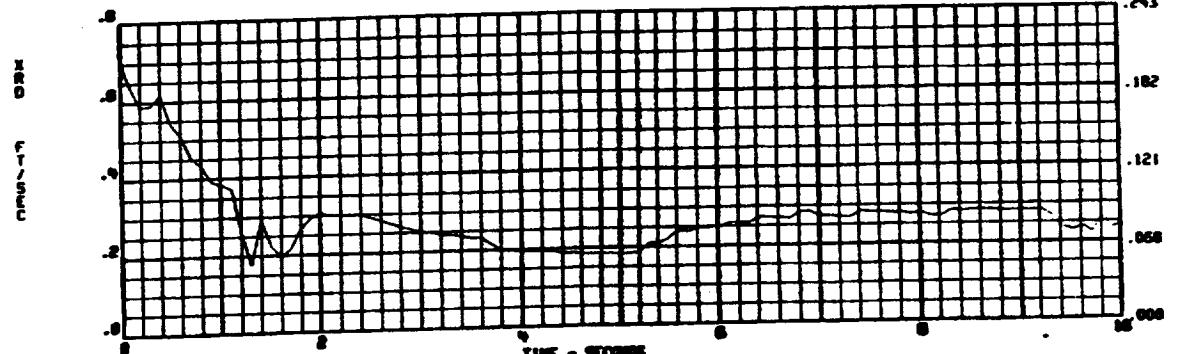




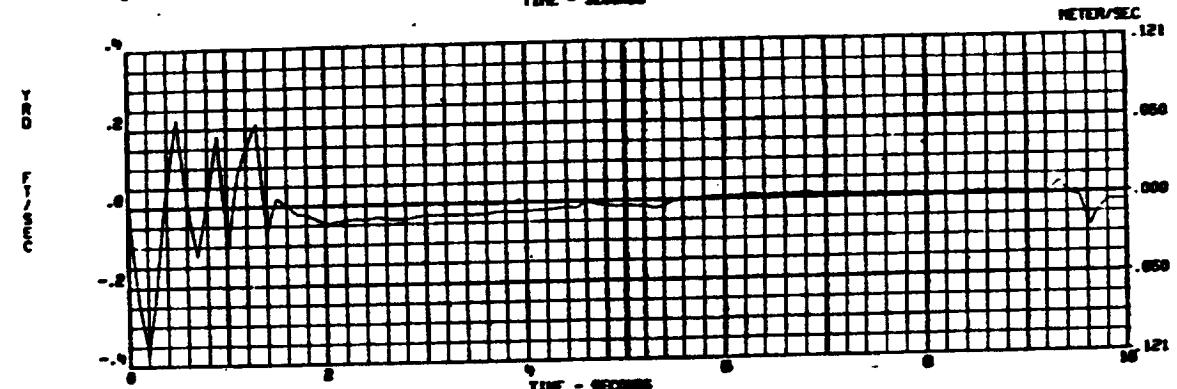
DOCKING DYNAMICS - CASE NO. = 28, ORBITER DOCKING, ASTP SYSTEM

4180740103  
022174 0008

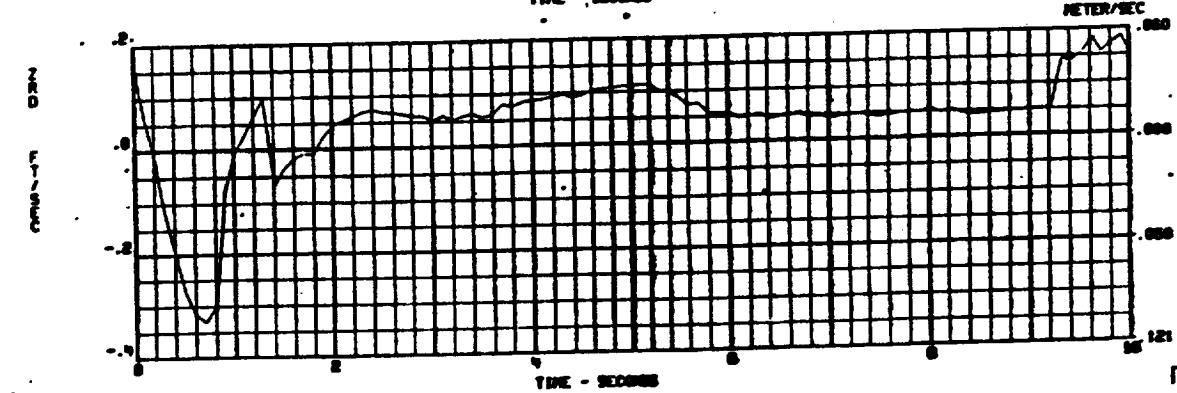
METER/SEC



TIME - SECONDS



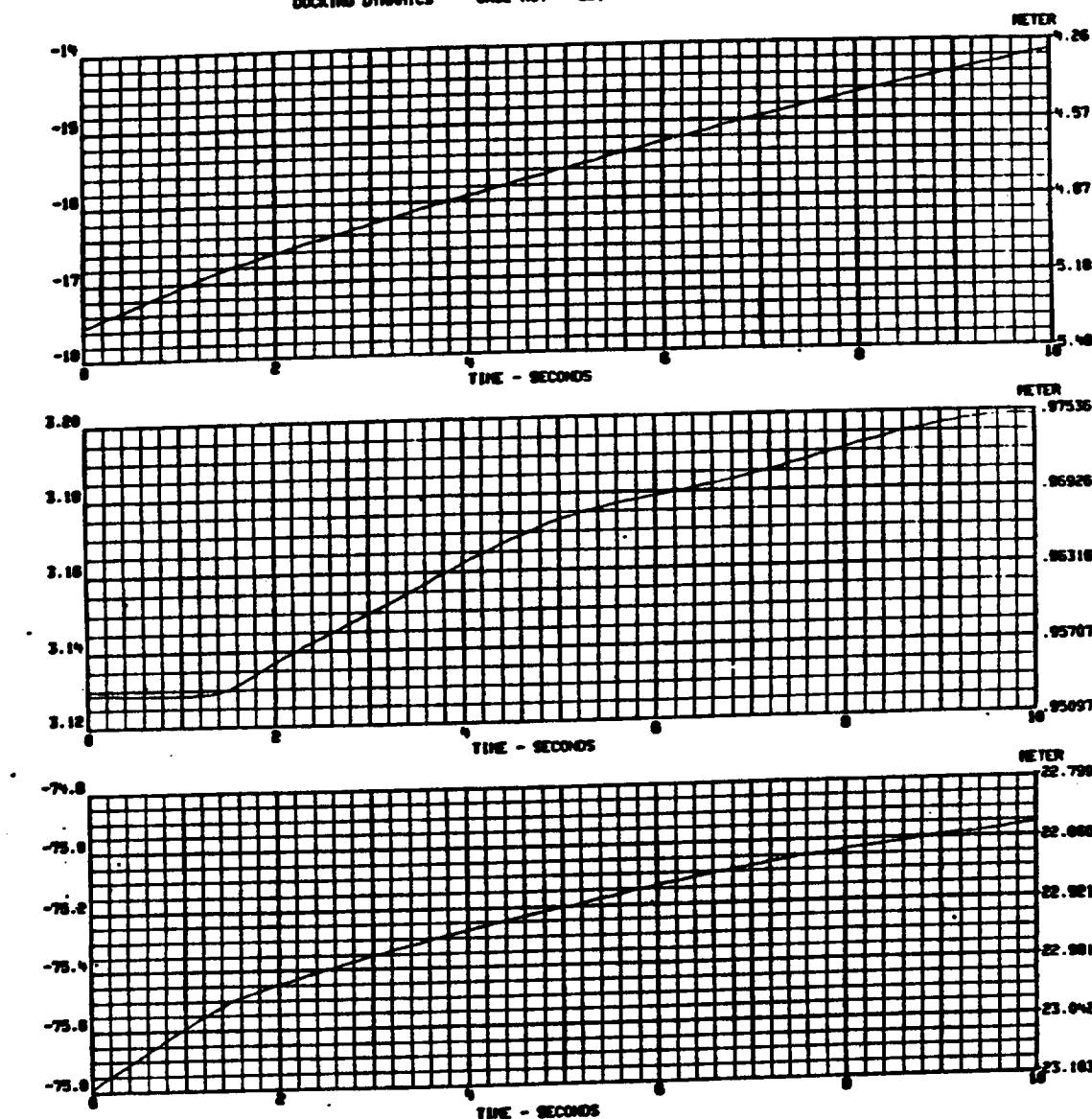
TIME - SECONDS



TIME - SECONDS



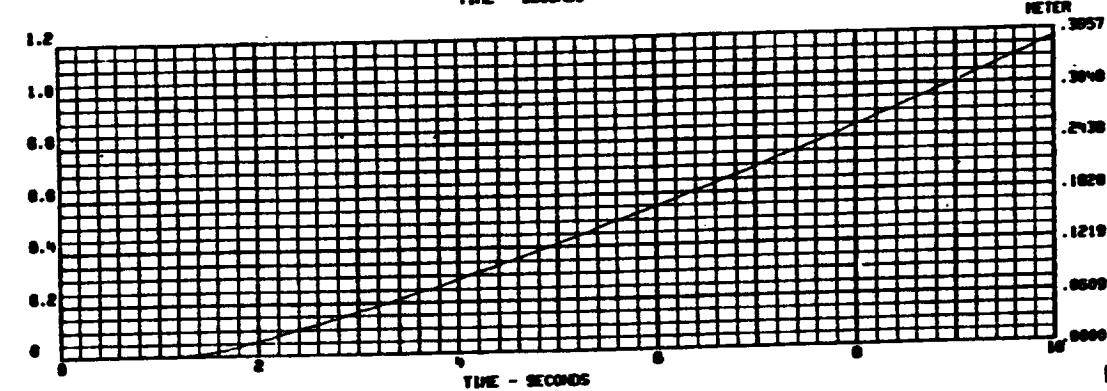
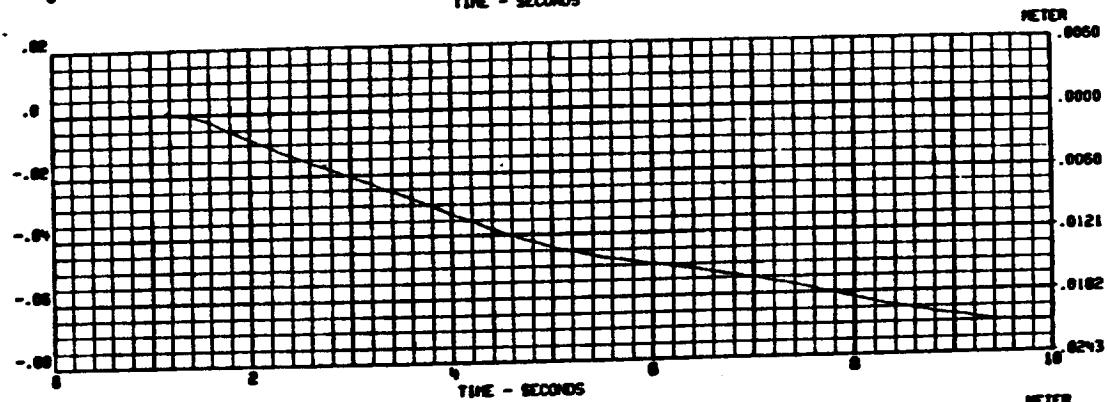
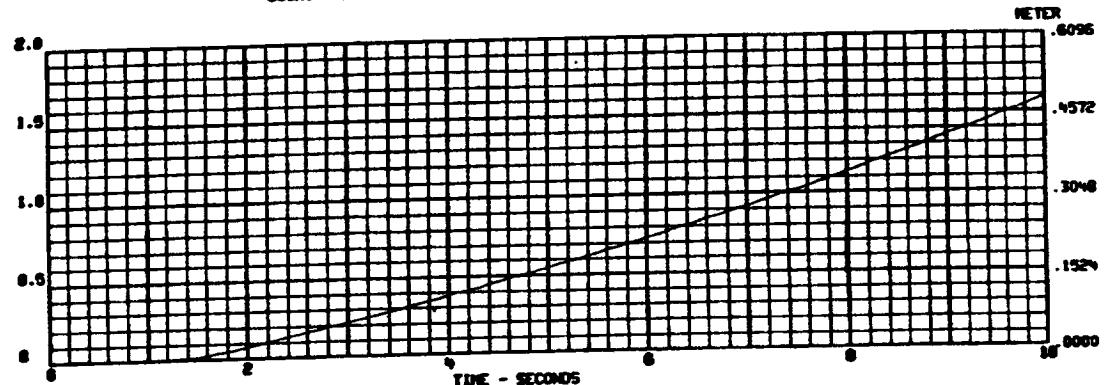
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4100740103  
022171 0009



DOCKING DYNAMICS - CASE NO. = 28, ORBITER DOCKING, ASTP SYSTEM

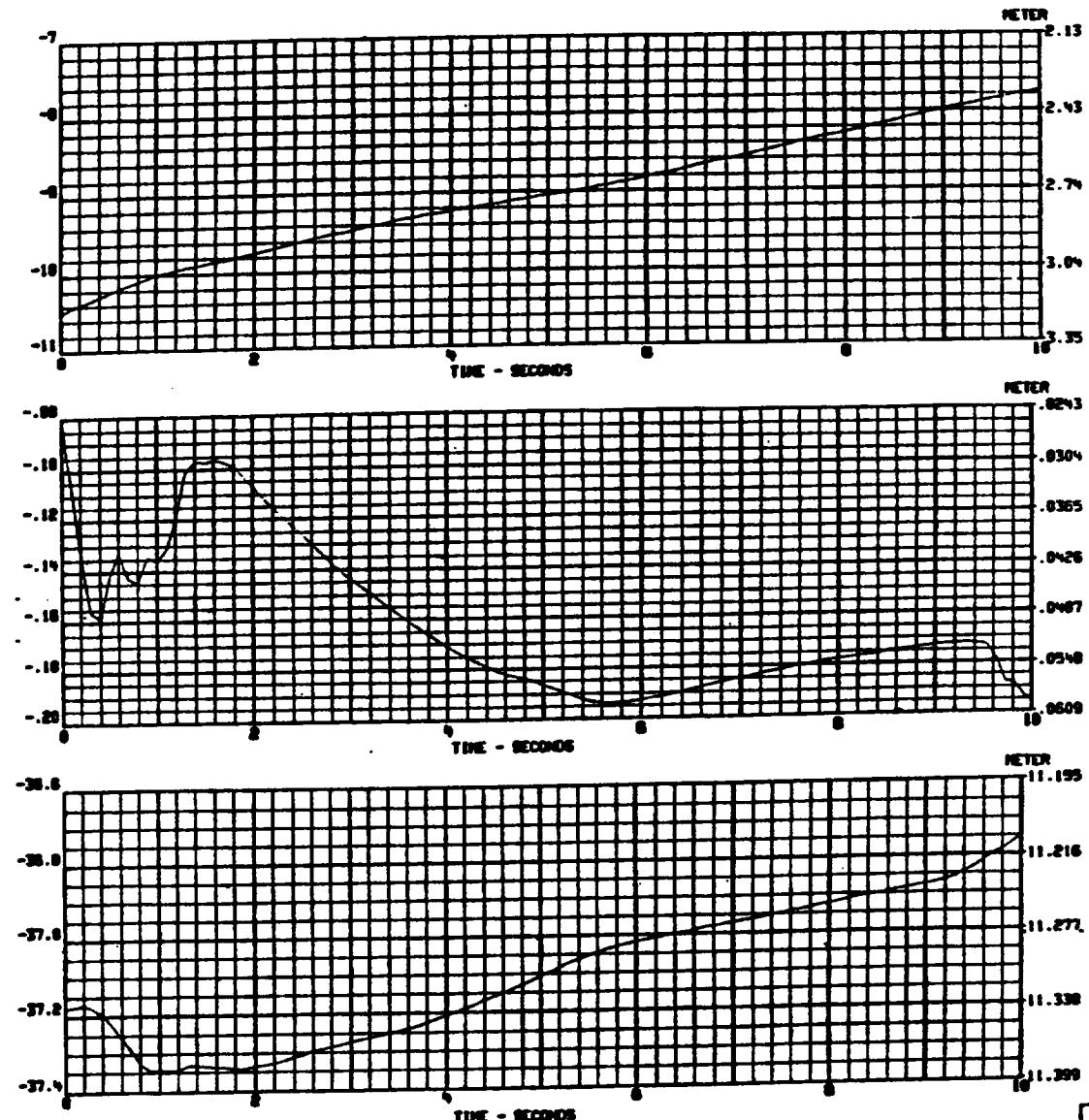
9108748103  
02174 0016





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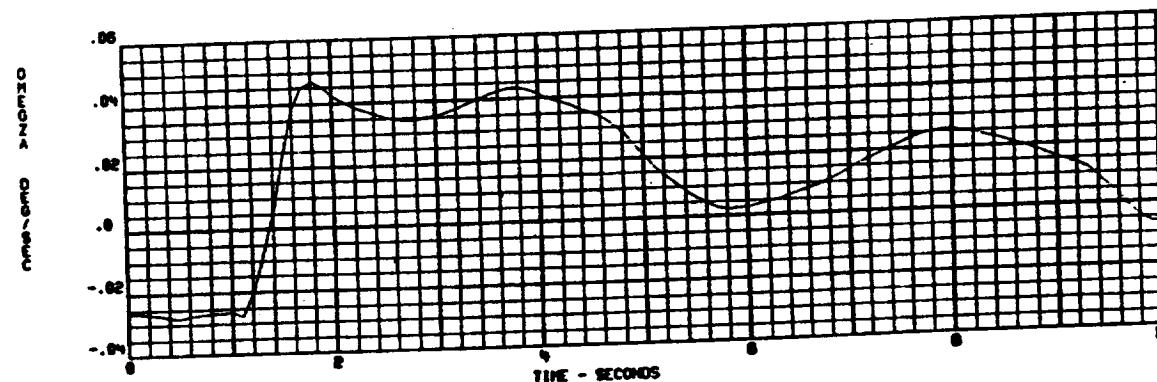
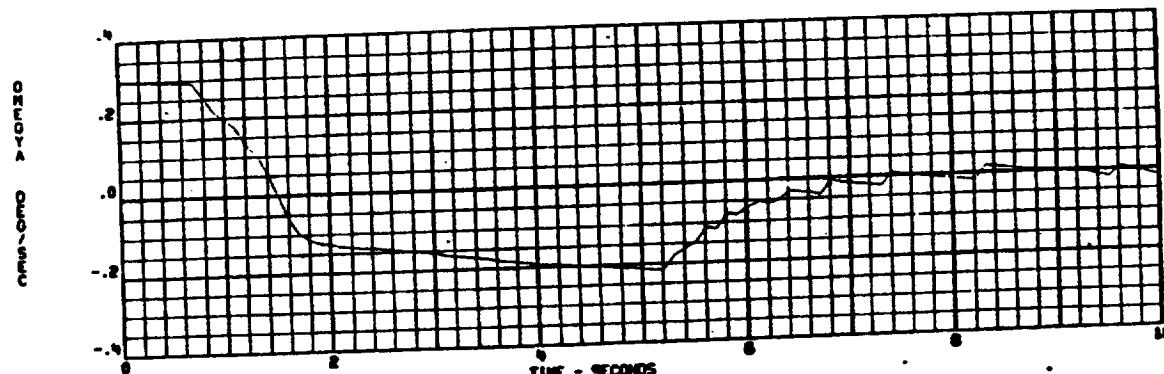
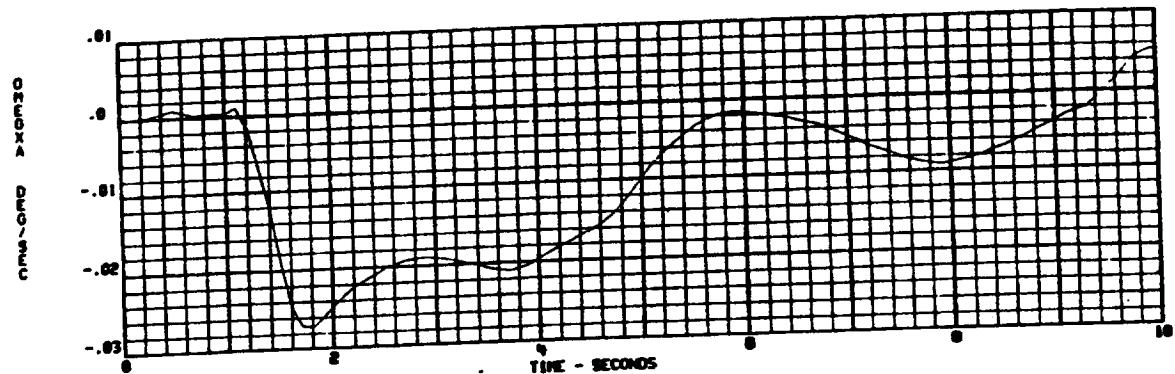
9108740103  
022174 0011





DOCKING DYNAMICS - CASE NO. = 28, ORBITER DOCKING, ASTP SYSTEM

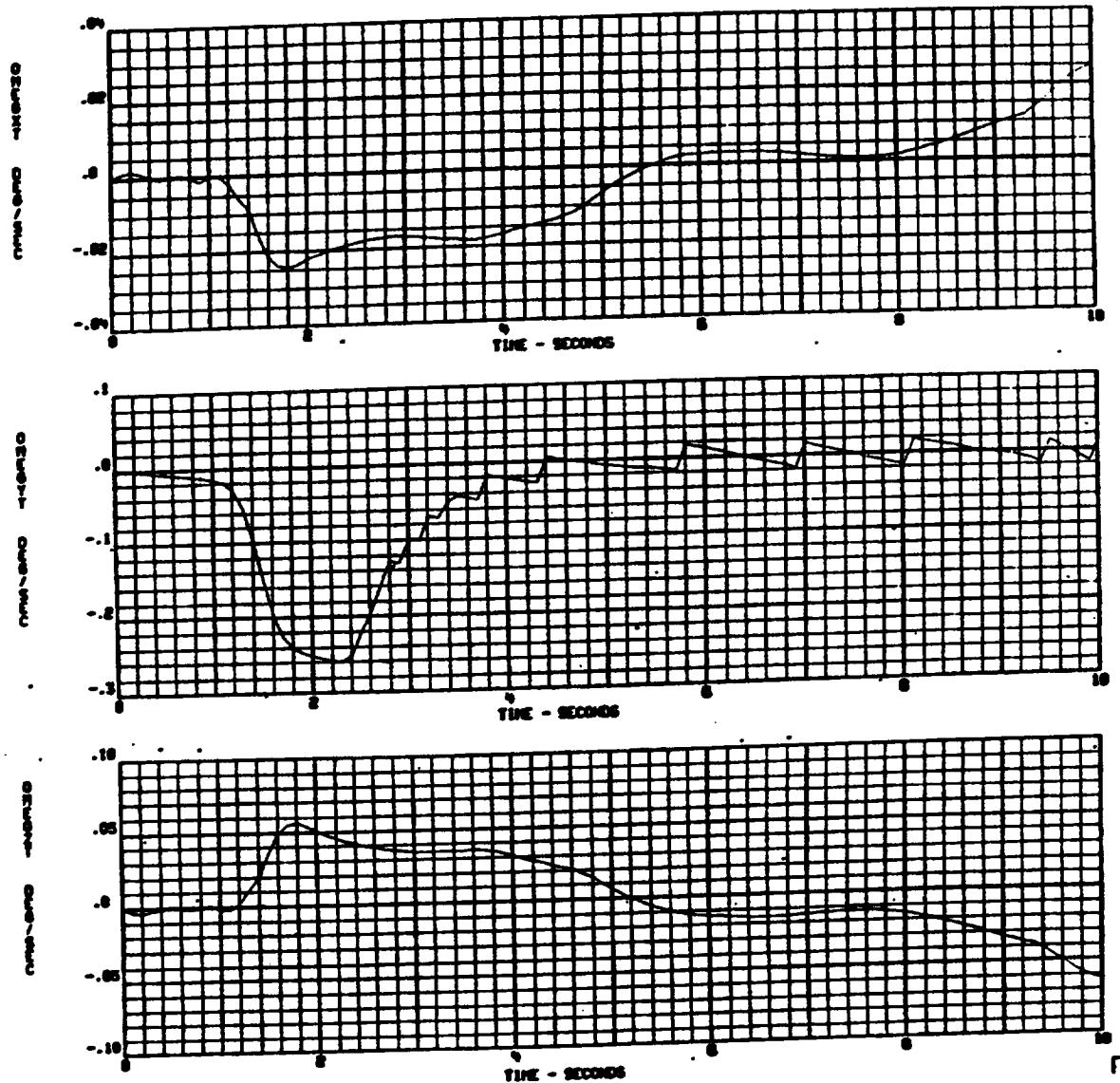
4100740103  
022174 0012





DOCKING DYNAMICS - CASE NO. = 28. ORBITER DOCKING, ASTP SYSTEM

9106740103  
022174 0013

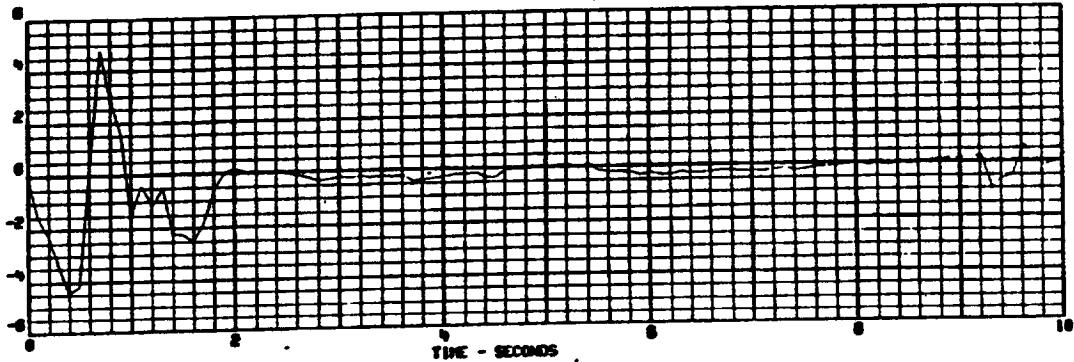




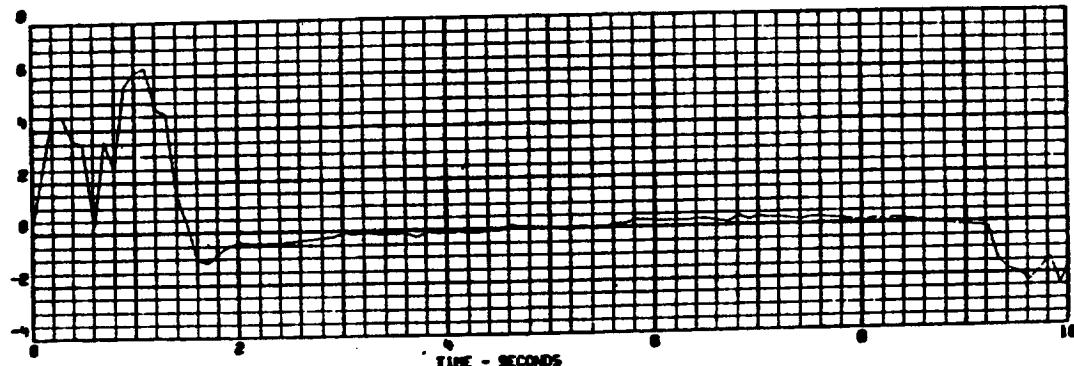
DOCKING DYNAMICS - CASE NO. = 28. ORBITER DOCKING. ASTP SYSTEM

9106740103  
022174 0014  
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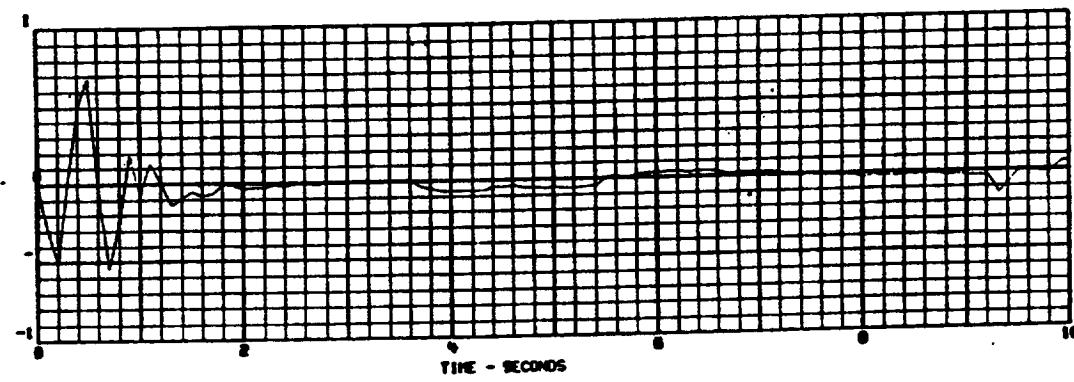
ORBITER DYNAMIC STATE



ORBITER DYNAMIC STATE



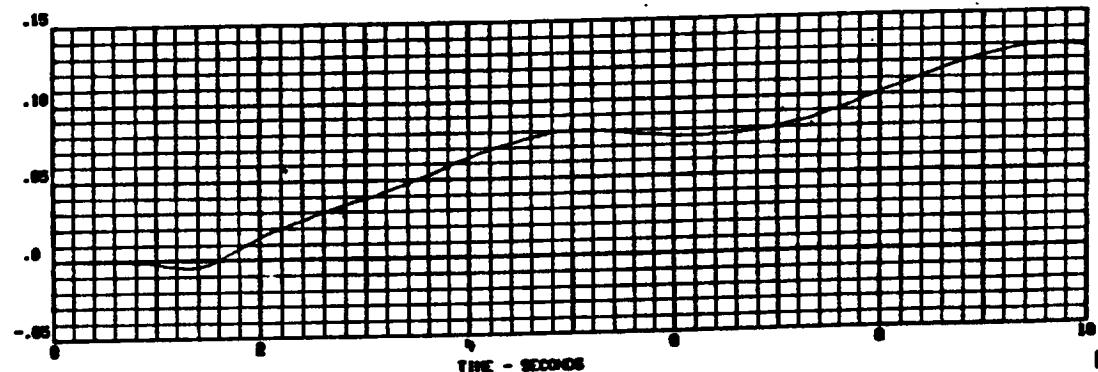
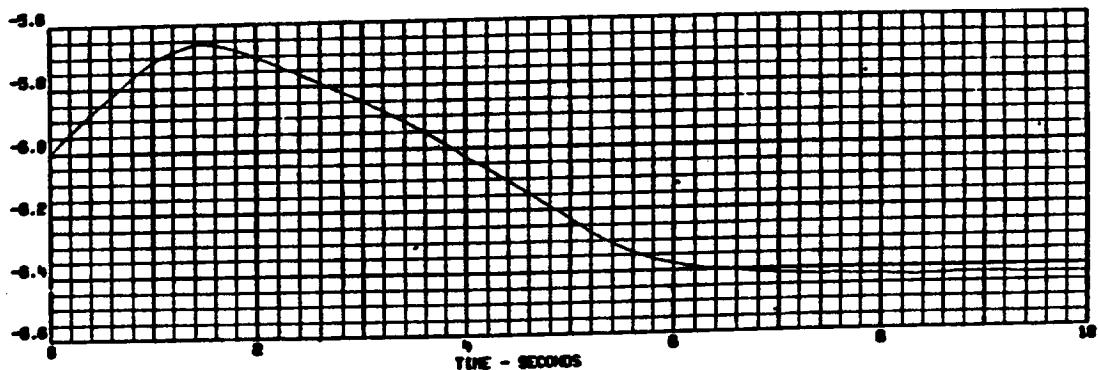
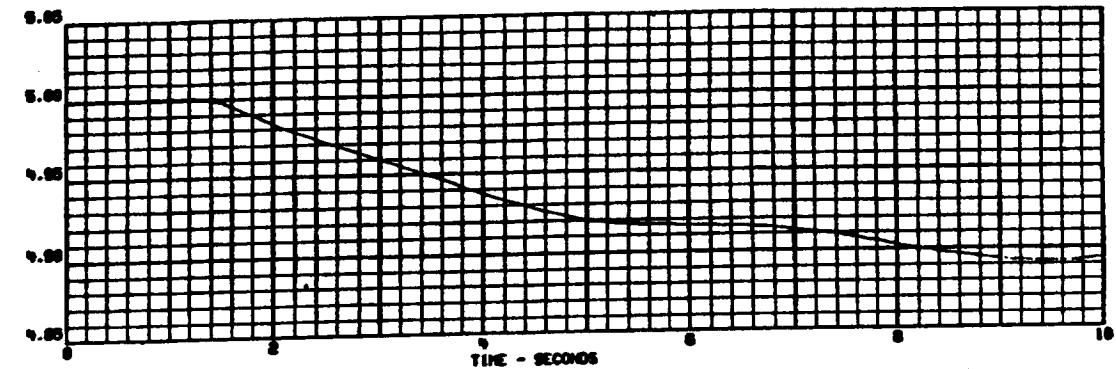
ORBITER DYNAMIC STATE





DOCKING DYNAMICS - CASE NO. - 2B. ORBITER DOCKING. ASTP SYSTEM

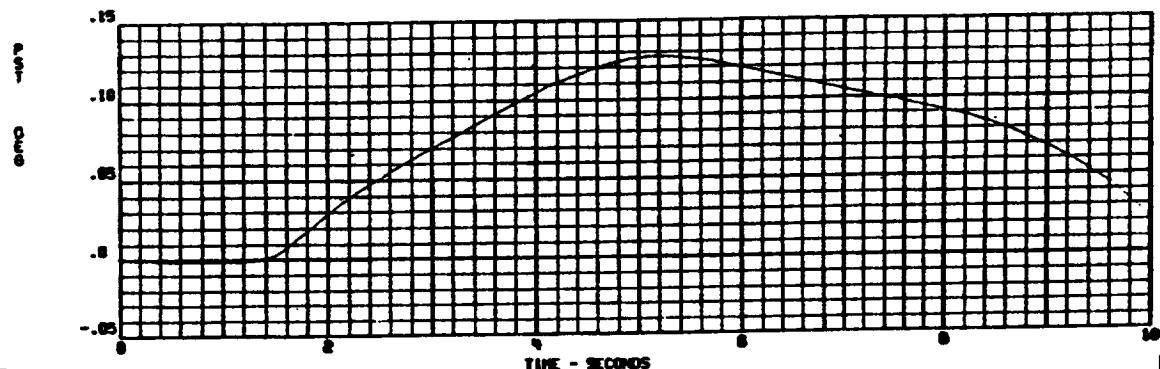
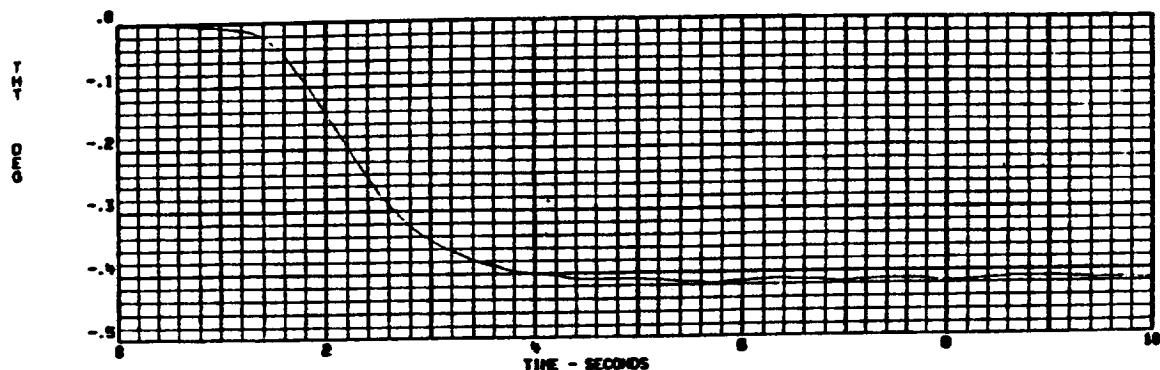
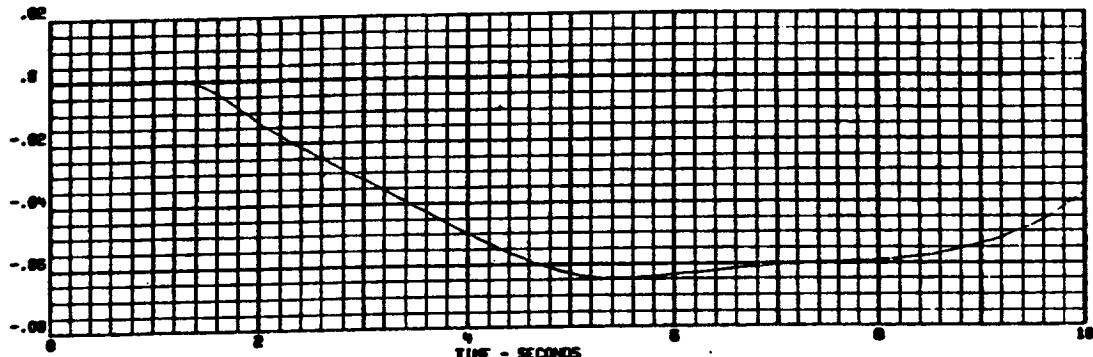
9108740105  
022174 0015





DOCKING DYNAMICS - CASE NO. = 28, ORBITER DOCKING, ASTP SYSTEM

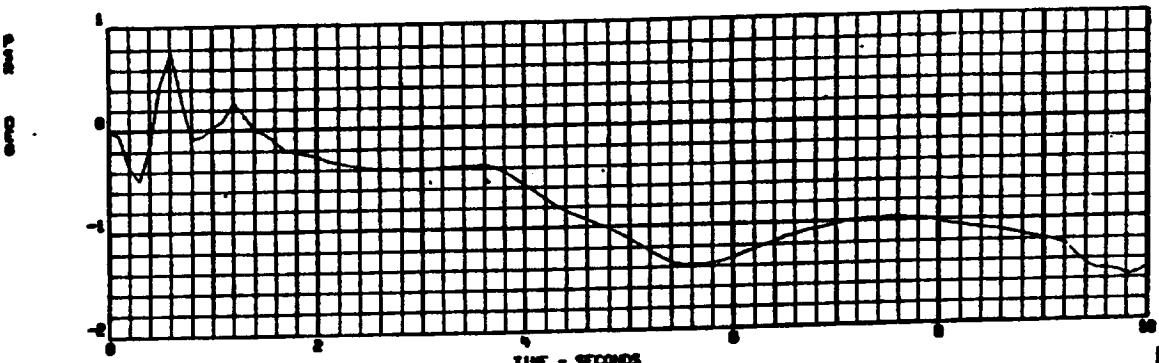
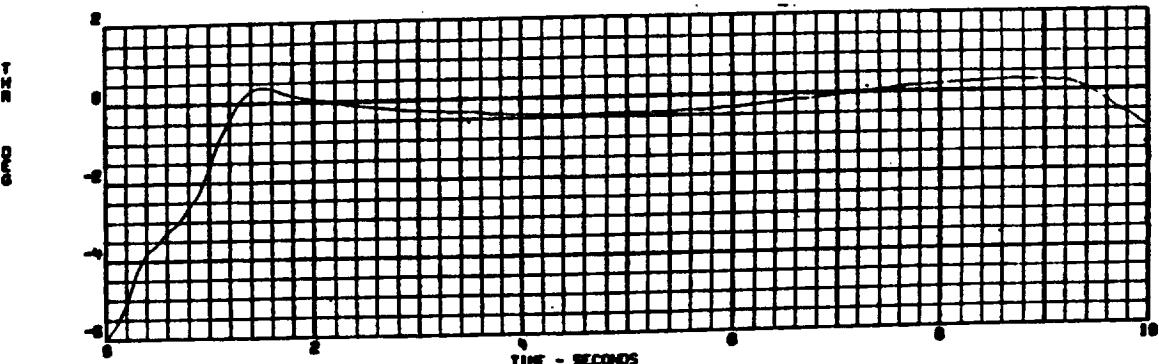
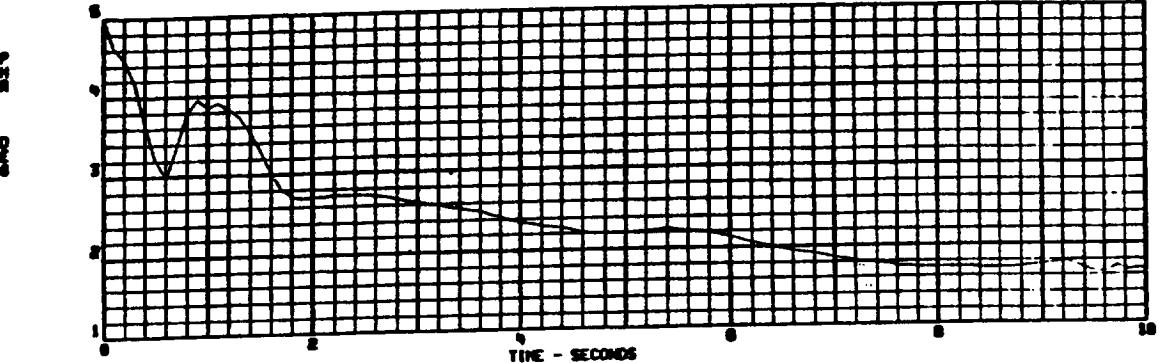
9108740103  
022174 0016





DOCKING DYNAMICS - CASE NO. = 28. ORBITER DOCKING. ASTP SYSTEM

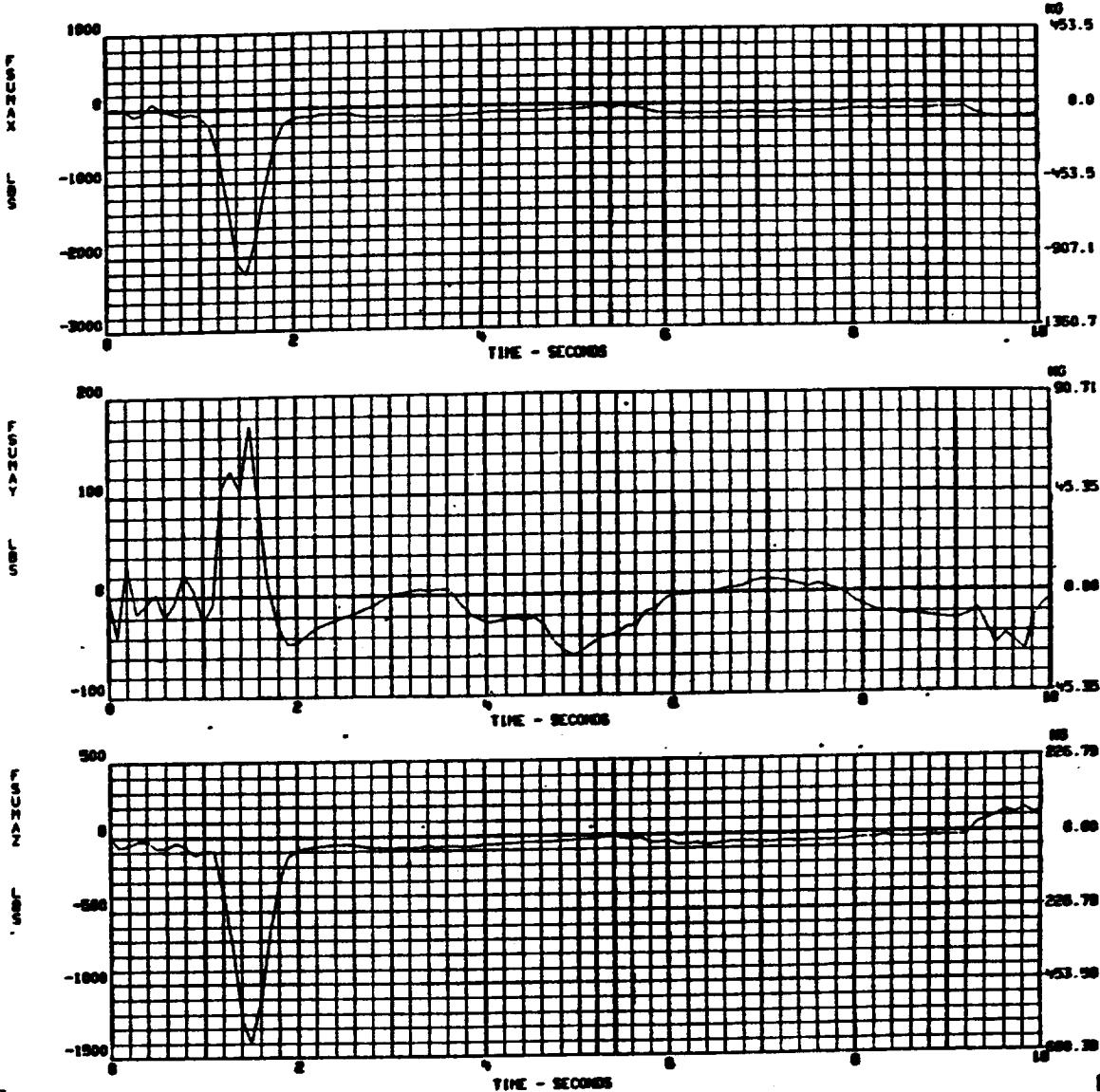
SD 74-0107  
022174 0017





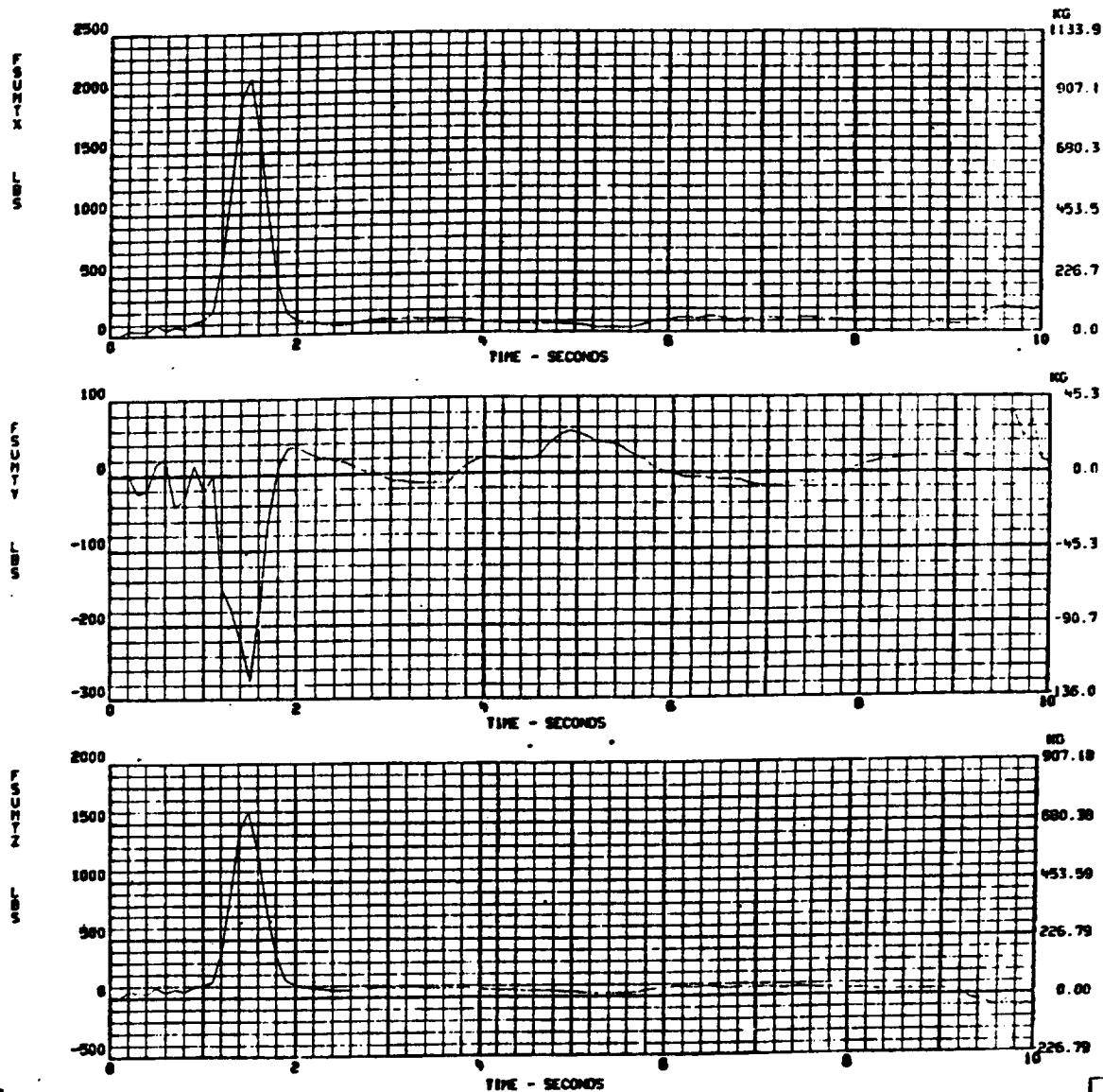
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9109740103  
822174 0018





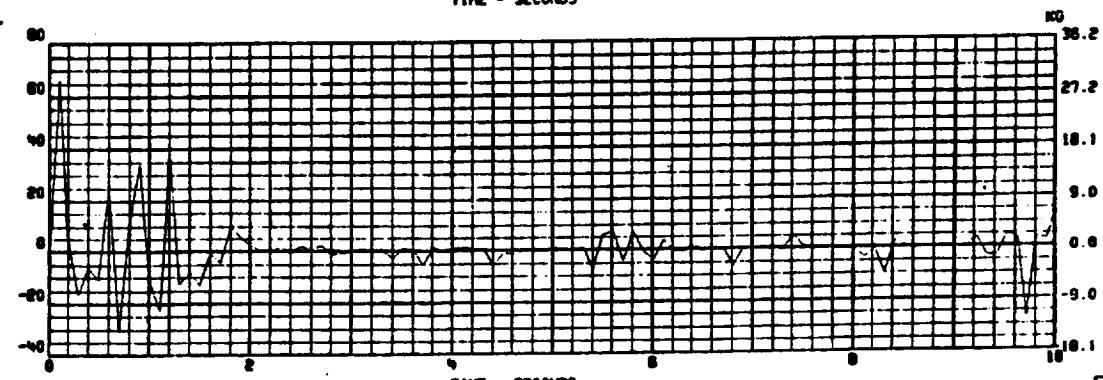
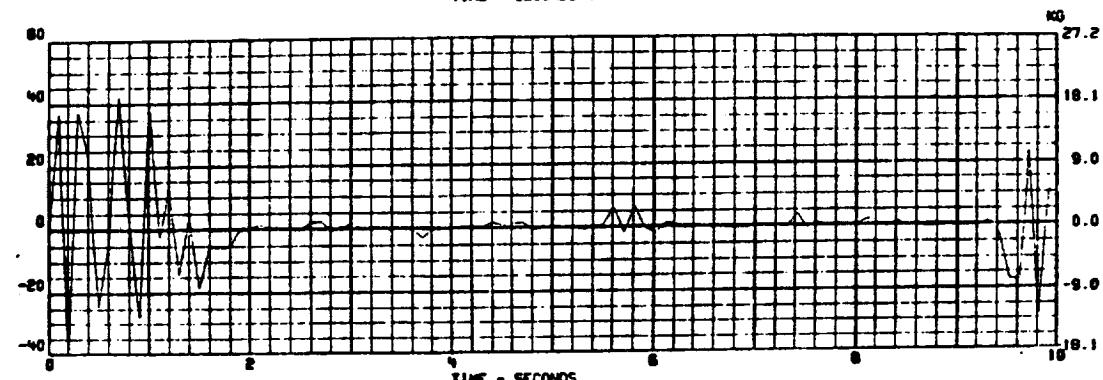
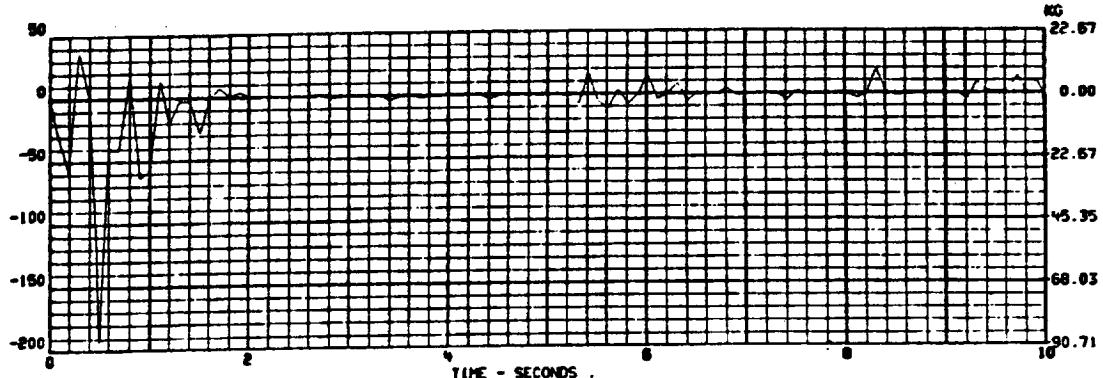
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9108740103  
022174 0019



DOCKING DYNAMICS - CASE NO. = 28,ORBITER DOCKING, ASTP SYSTEM

4108740103  
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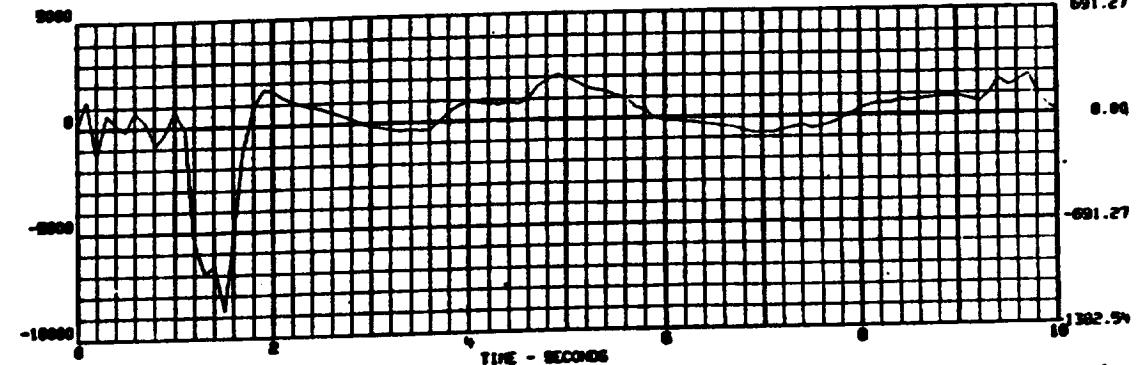




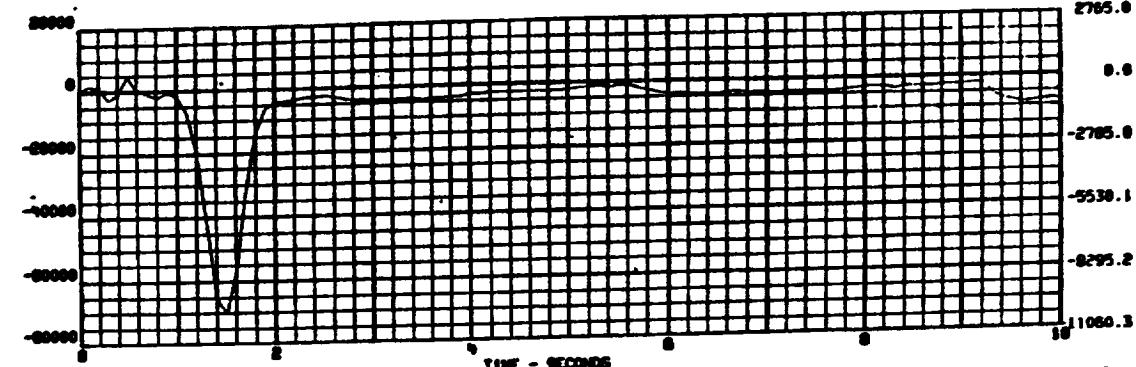
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4100740103  
SD2179 0021

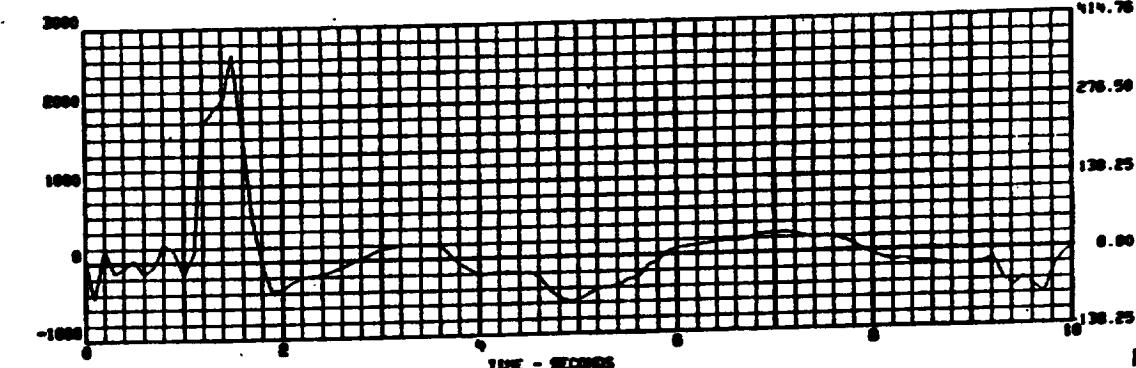
PETER-KO  
691.27



PETER-KO  
2765.0



PETER-KO  
414.76

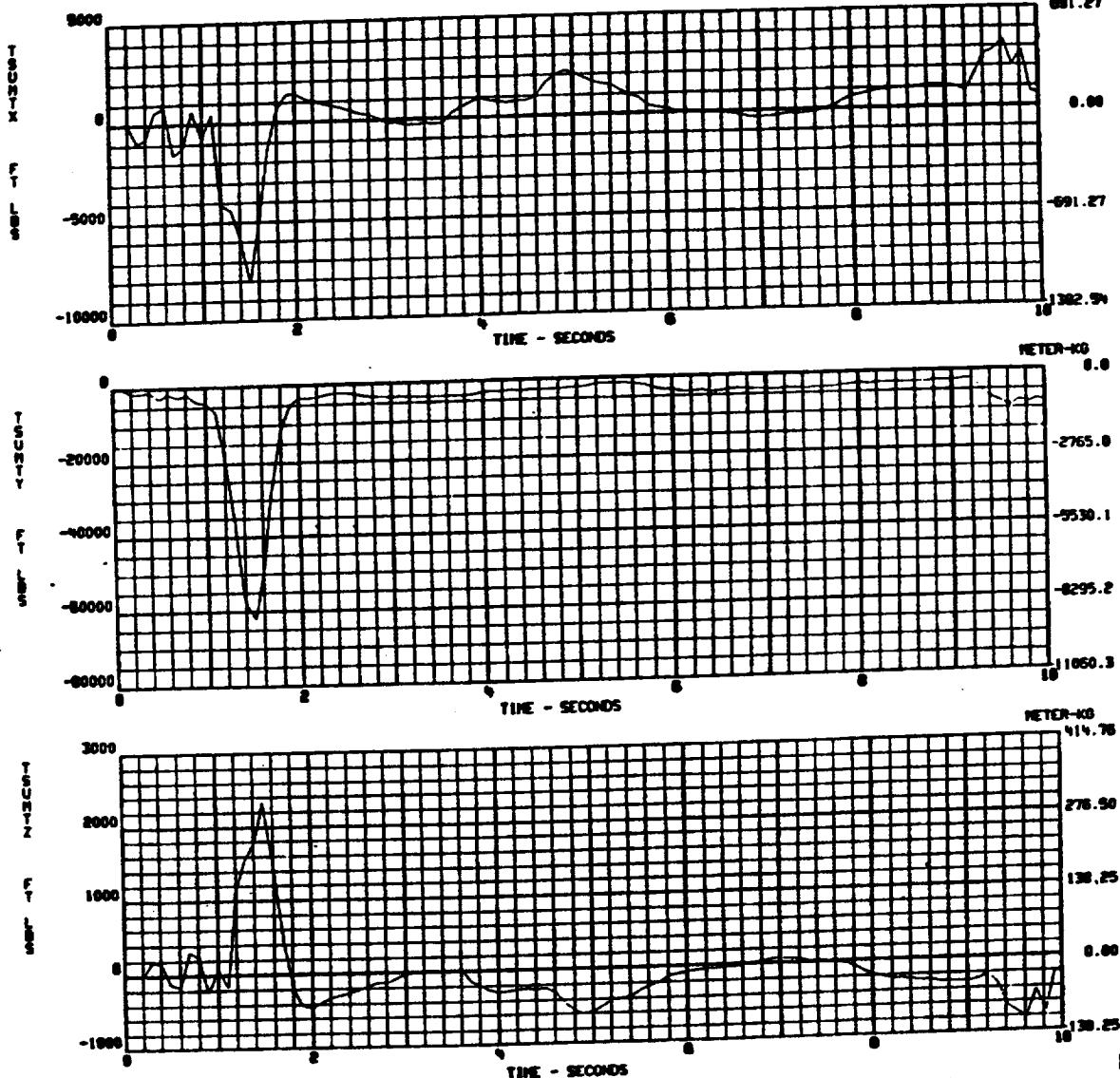




DOCKING DYNAMICS - CASE NO. = 29, ORBITER DOCKING, ASTP SYSTEM

N108740103  
022179 0022

METER-KG  
081.27

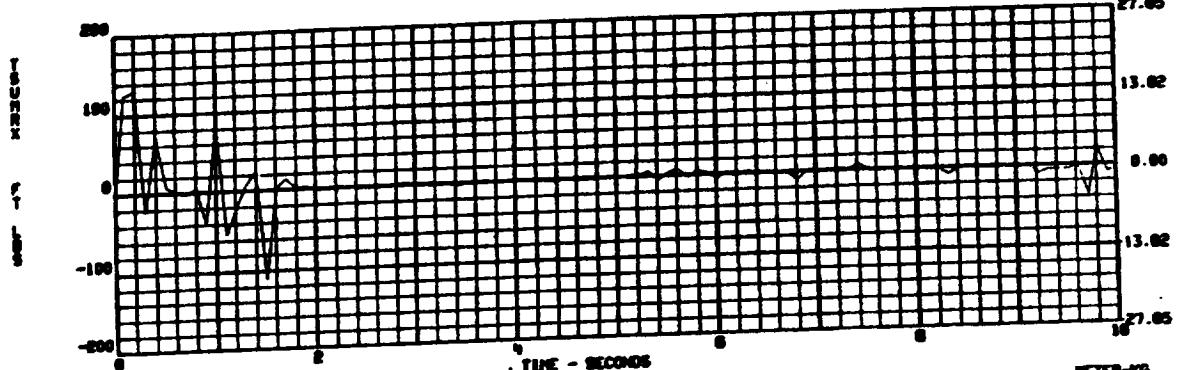




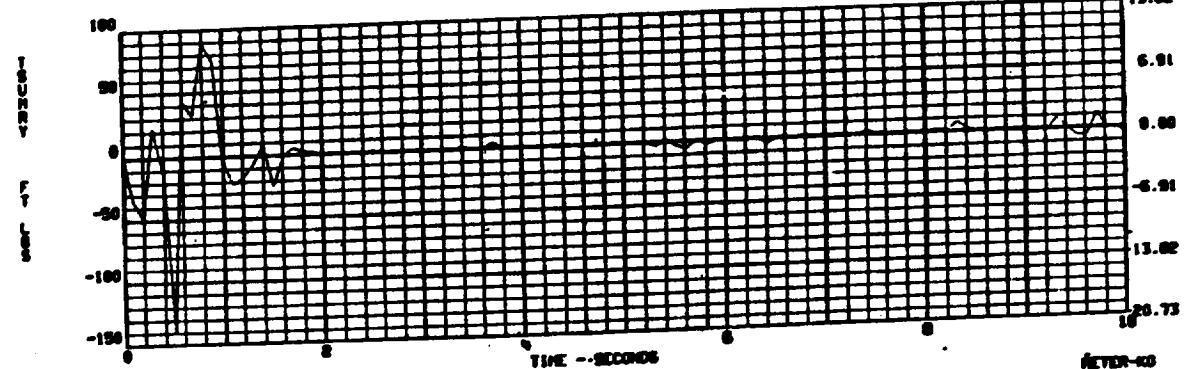
DOCKING DYNAMICS - CASE NO. = 20. ORBITER DOCKING. ASTP SYSTEM

9108740103  
022170 0023

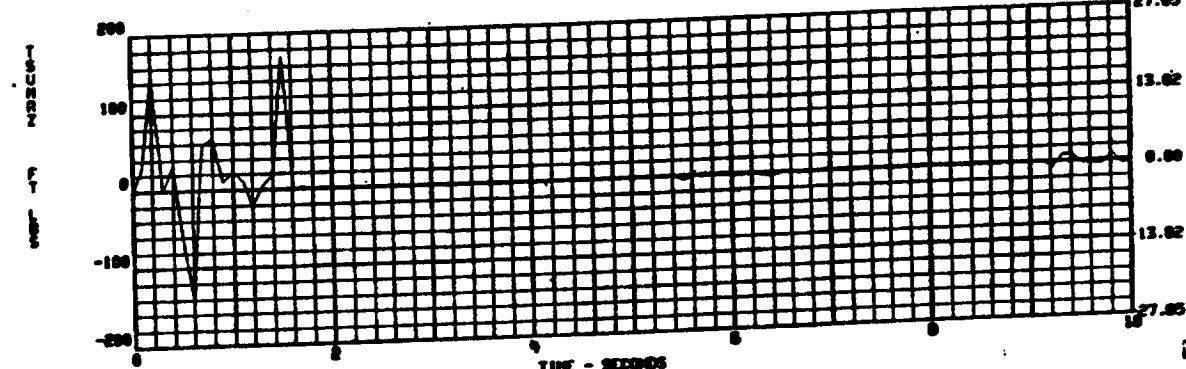
VECTOR-10 27.05



VECTOR-10 13.02



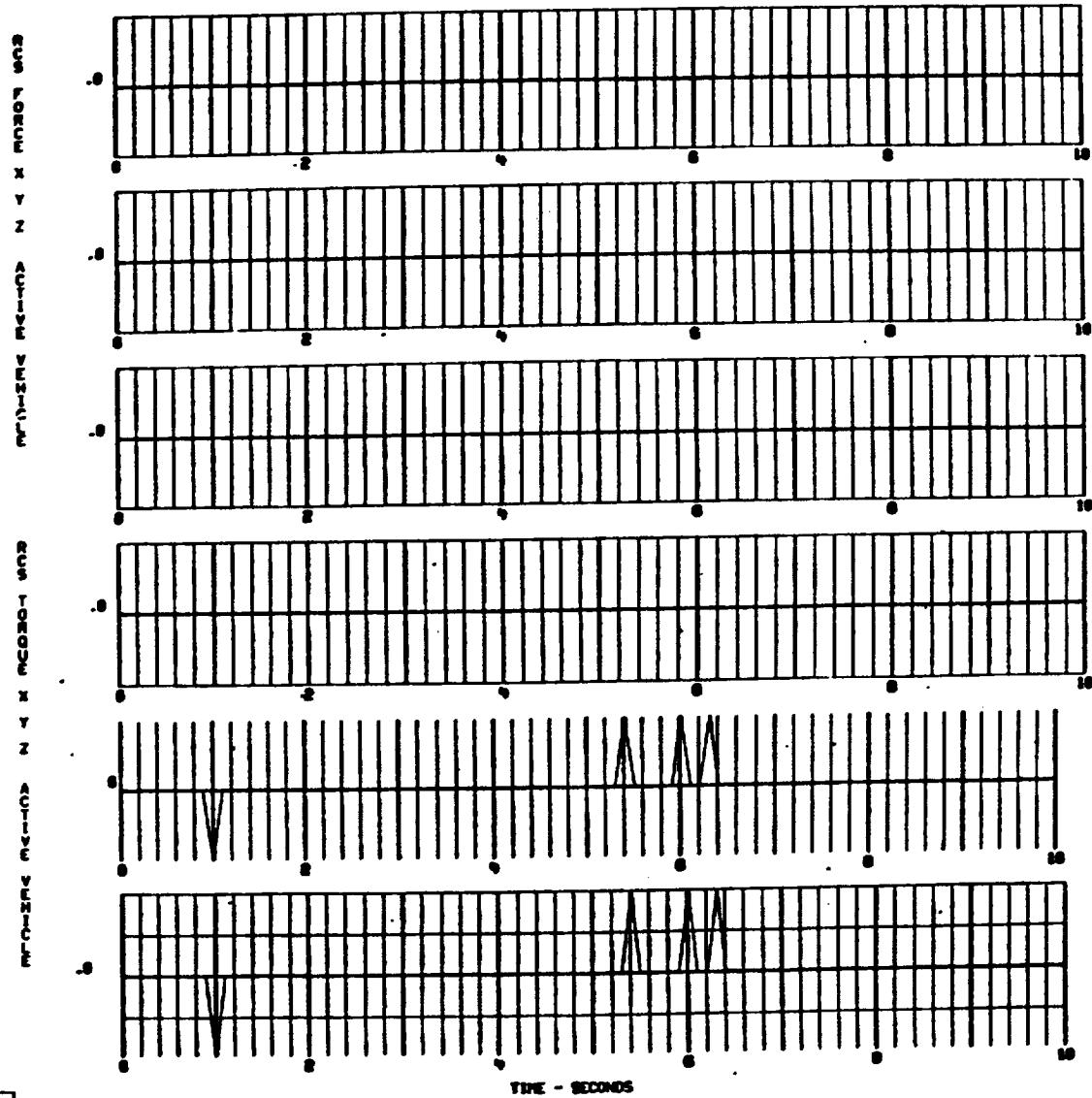
VECTOR-10 27.05





DOCKING DYNAMICS - CASE NO. - 28, ORBITER DOCKING, ASTP SYSTEM

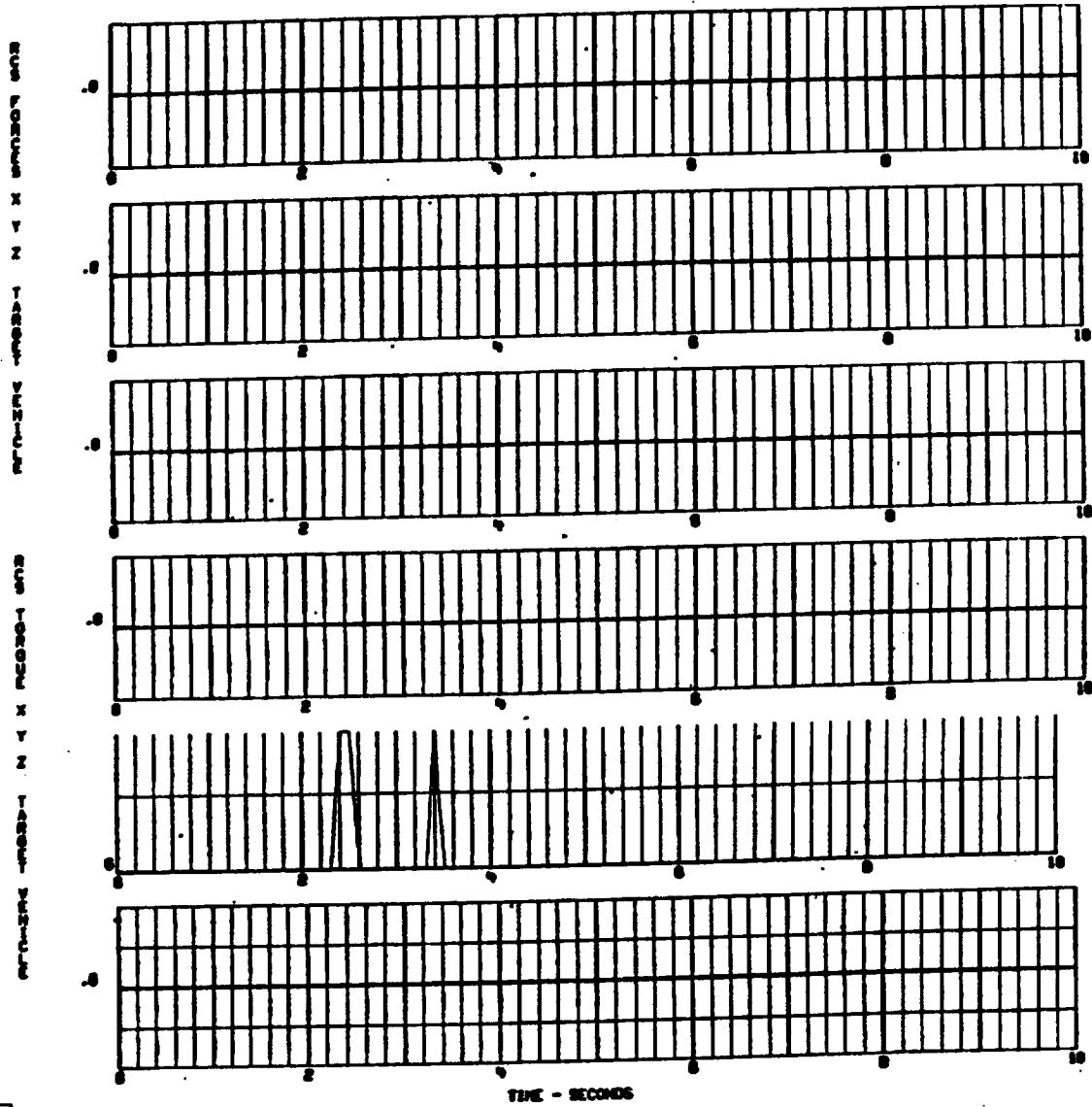
9108740103  
022174 0024





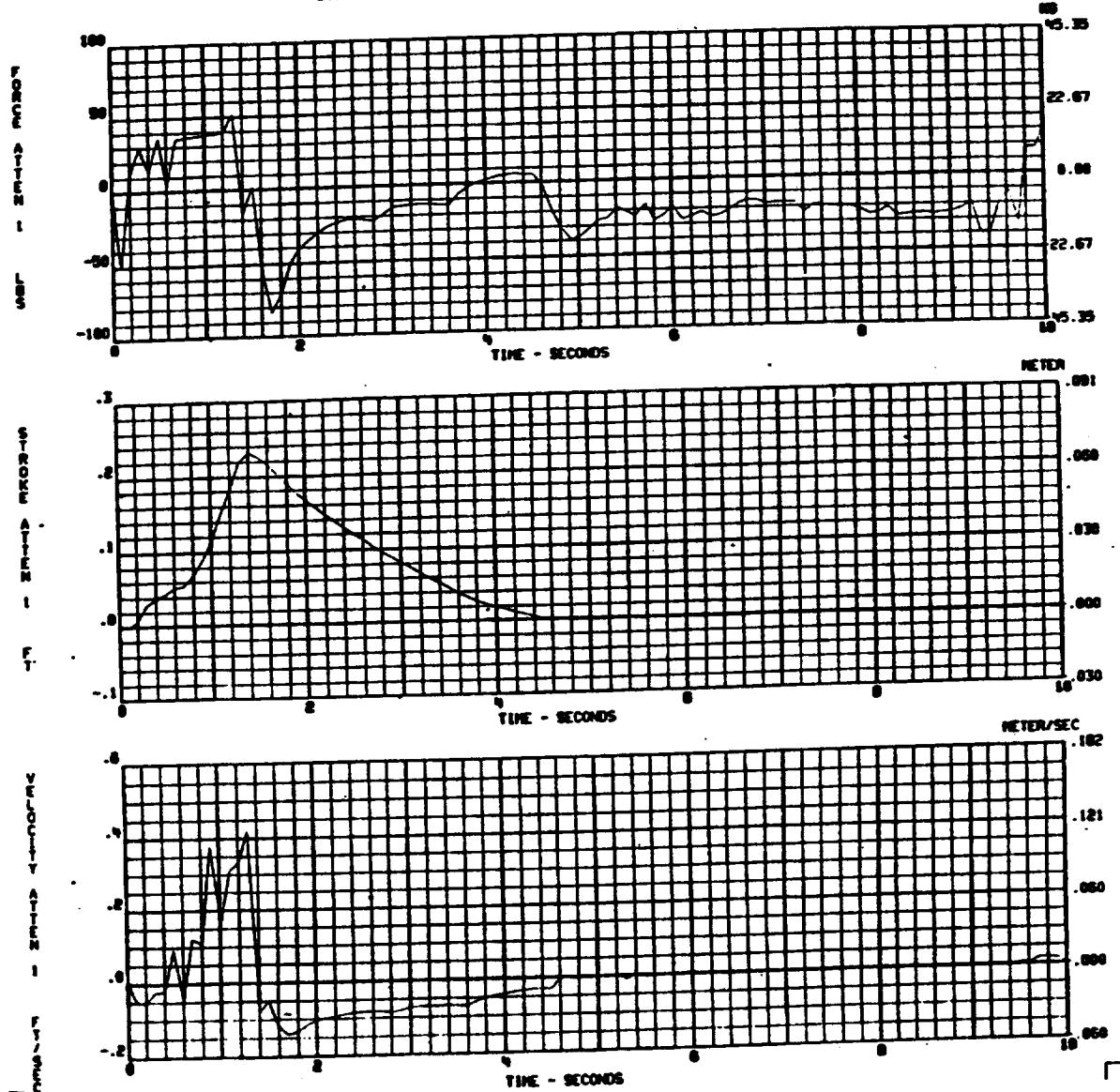
DOCKING DYNAMICS - CASE NO. = 28, ORBITER DOCKING, ASTP SYSTEM

5100740103  
02174 0025



DOCKING DYNAMICS - CASE NO. = 28. ORBITER DOCKING, ASTP SYSTEM

310874-0103  
022174 0023

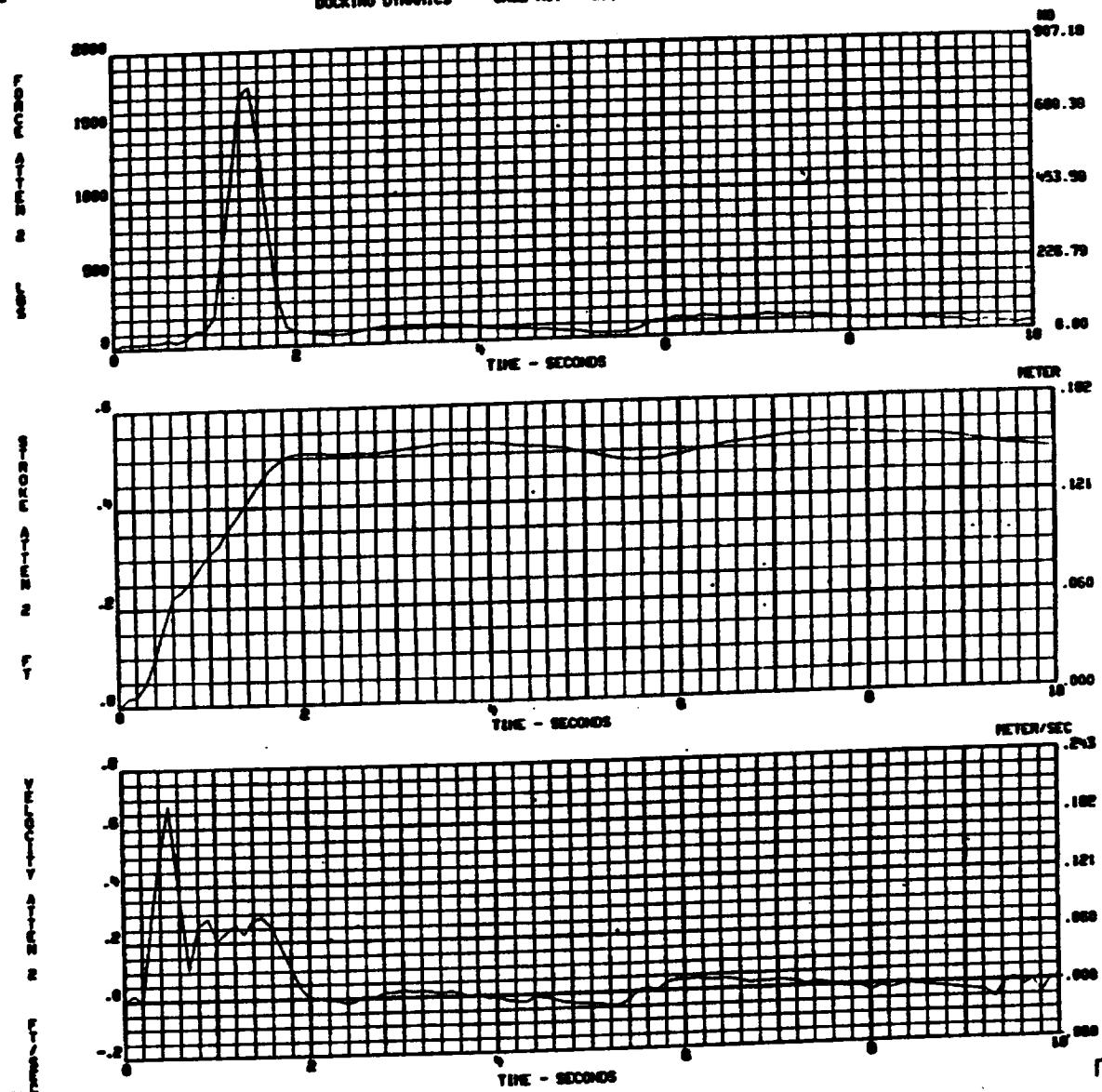




Space Division  
Rockwell International

DOCKING DYNAMICS - CASE NO. = 2B. ORBITER DOCKING. ASTP SYSTEM

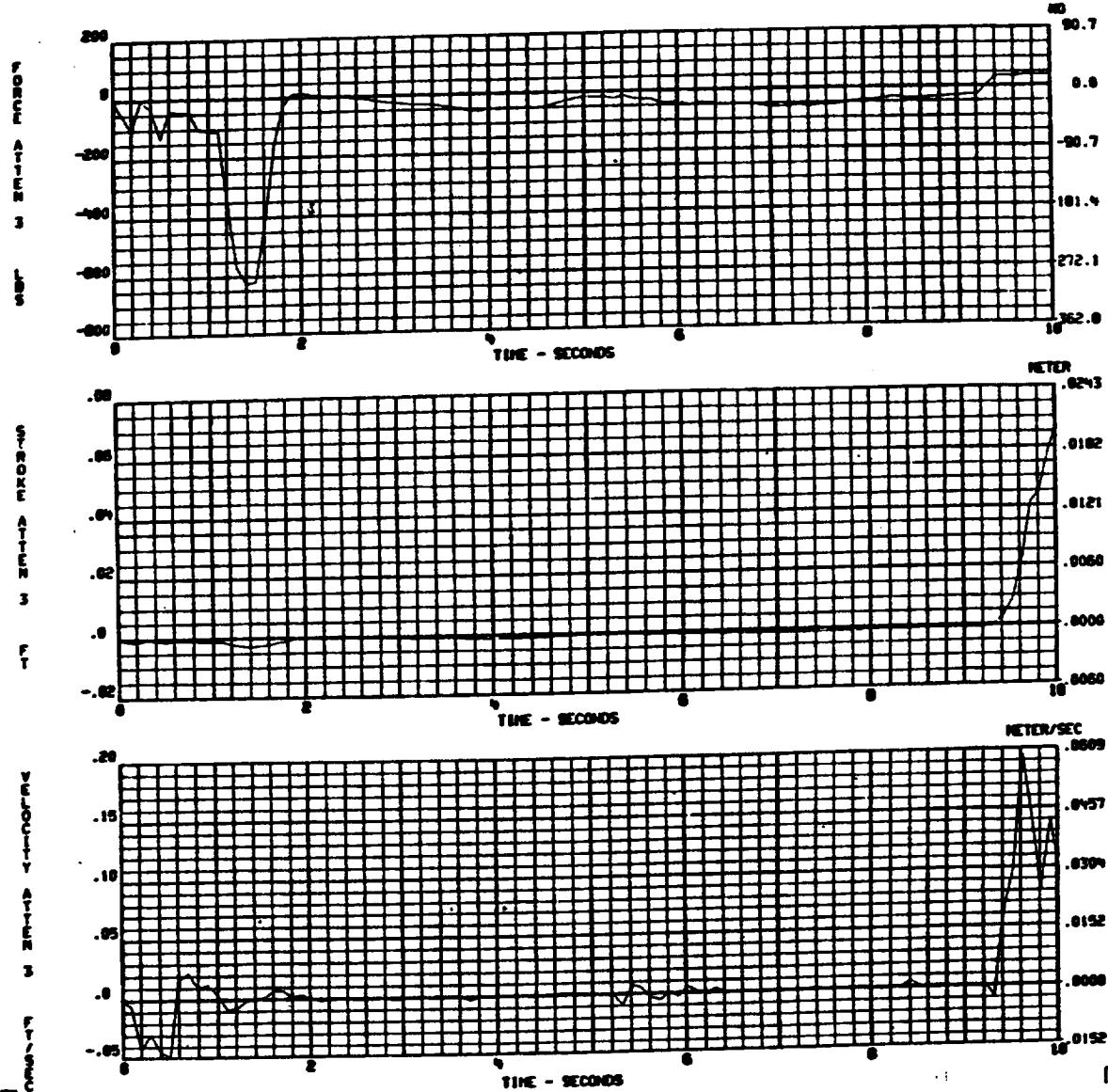
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022174 0027





DOCKING DYNAMICS - CASE NO. = 2B, ORBITER DOCKING, ASTP SYSTEM

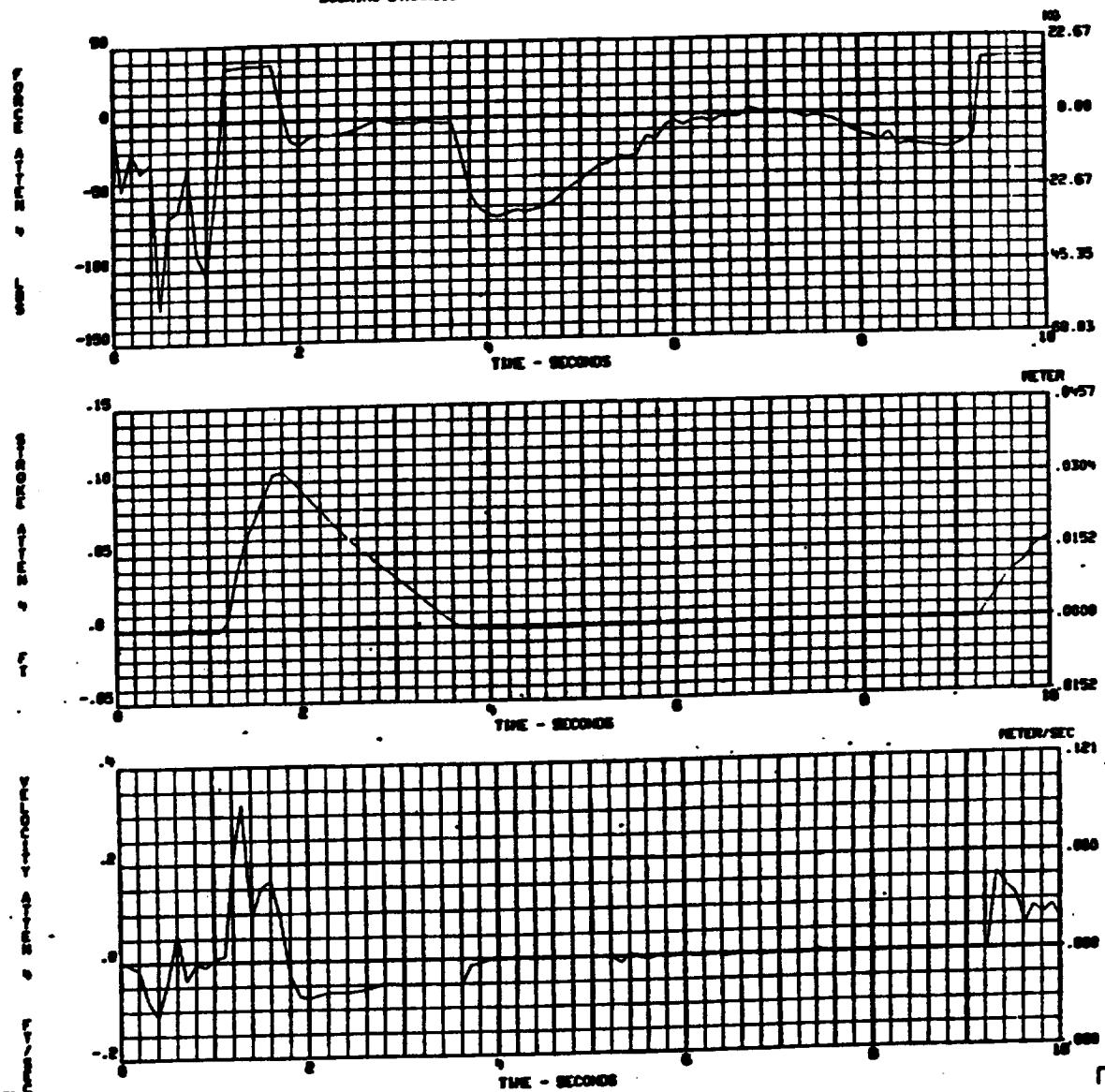
9100740103  
022174 8028





DOCKING DYNAMICS - CASE NO. - 28. ORBITER DOCKING. ASTP SYSTEM

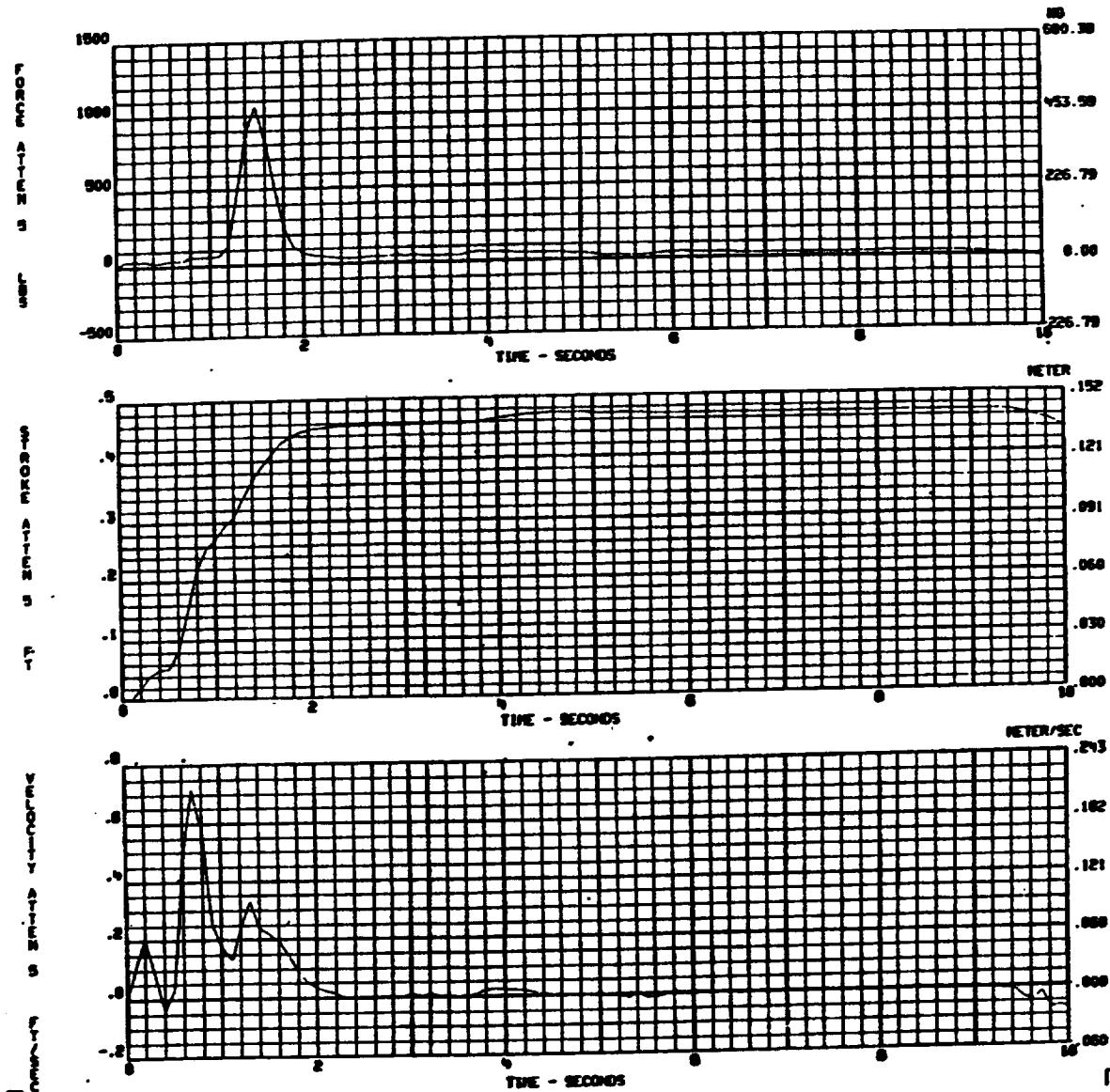
4188746103  
022170 0023





DOCKING DYNAMICS - CASE NO. = 28, ORBITER DOCKING, ASTP SYSTEM

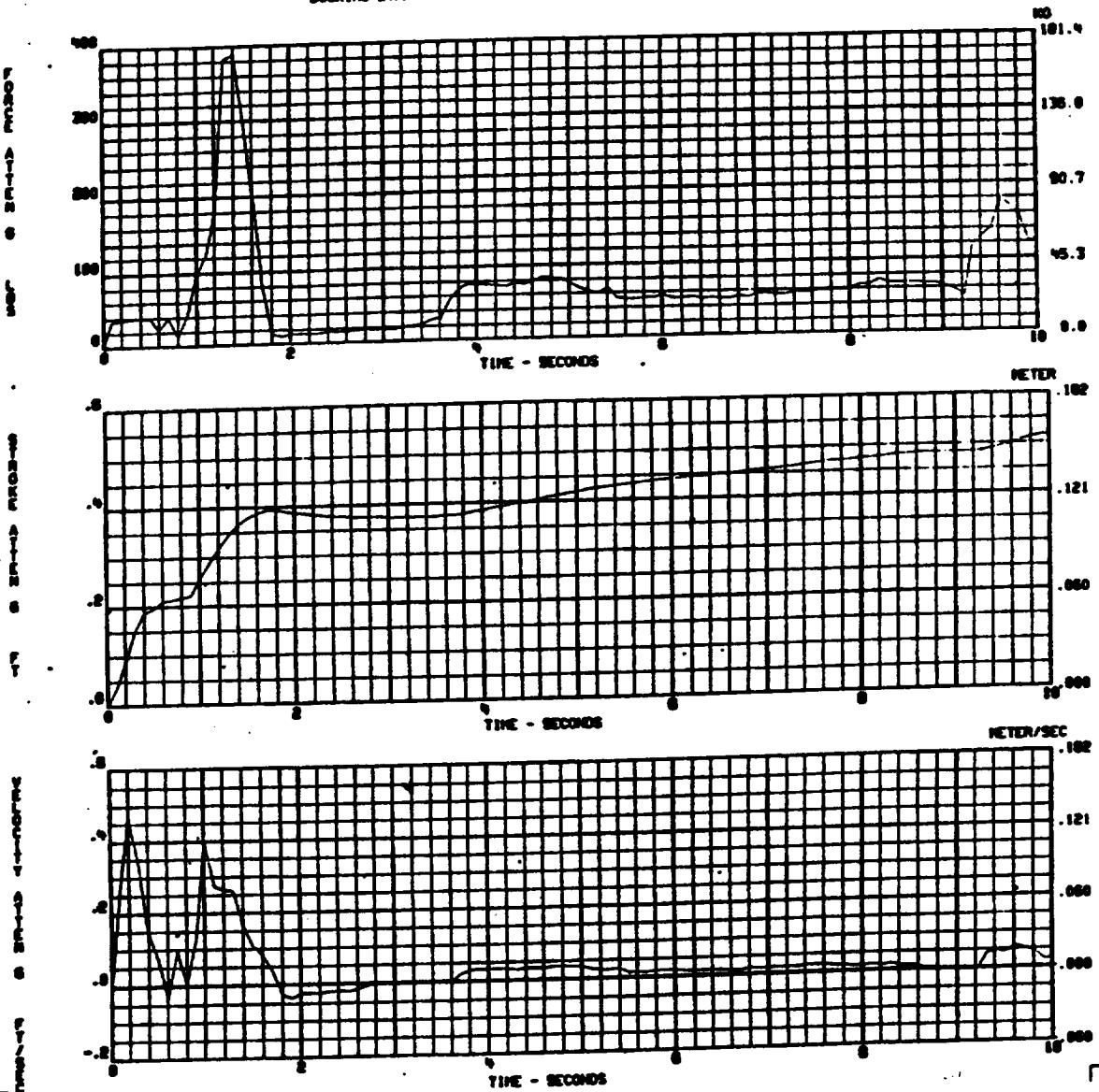
9108740103  
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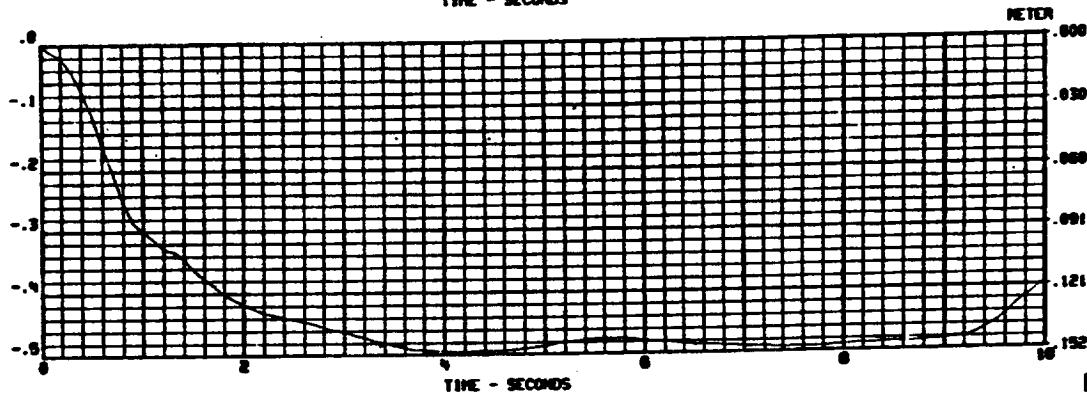
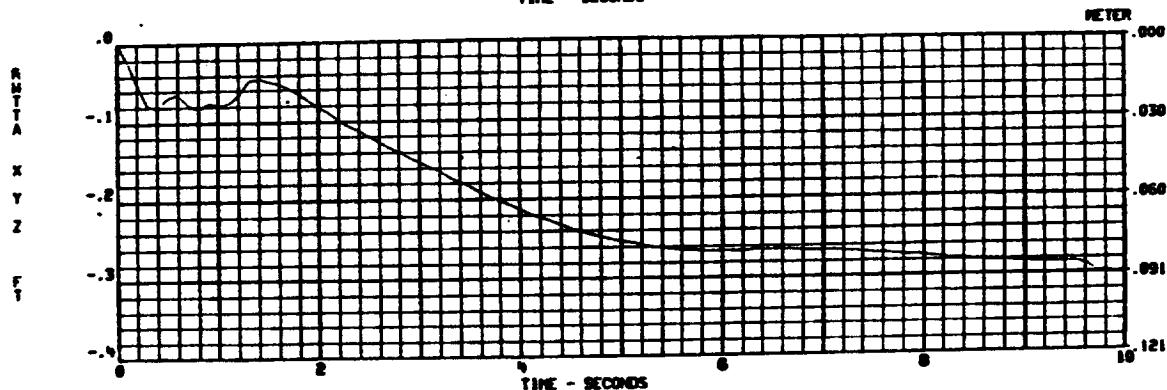
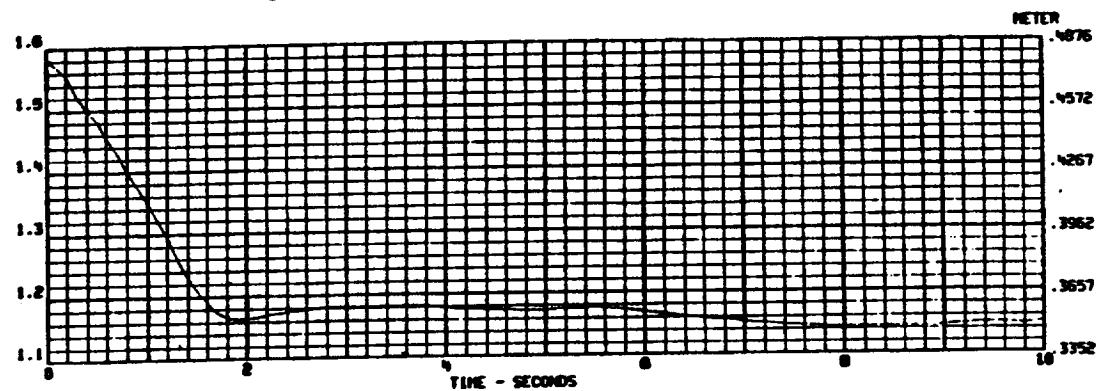
DOCKING DYNAMICS - CASE NO. - 28, ORBITER DOCKING, ASTP SYSTEM

SD 74-C8-0023  
022179 0031





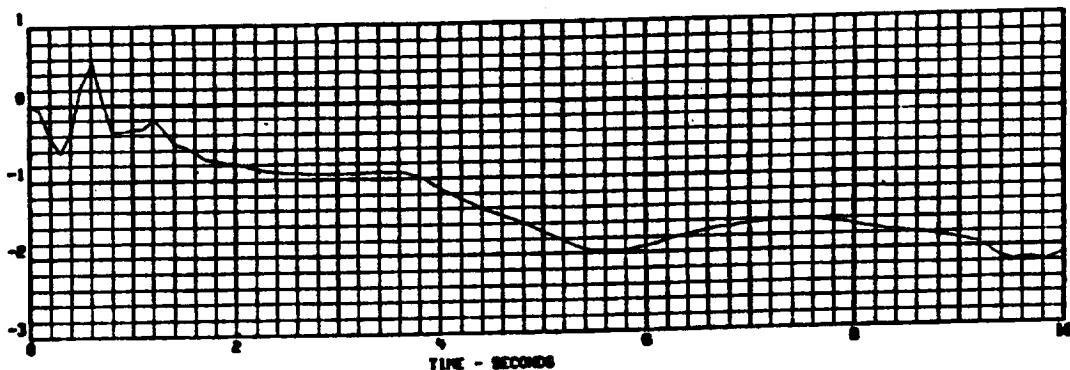
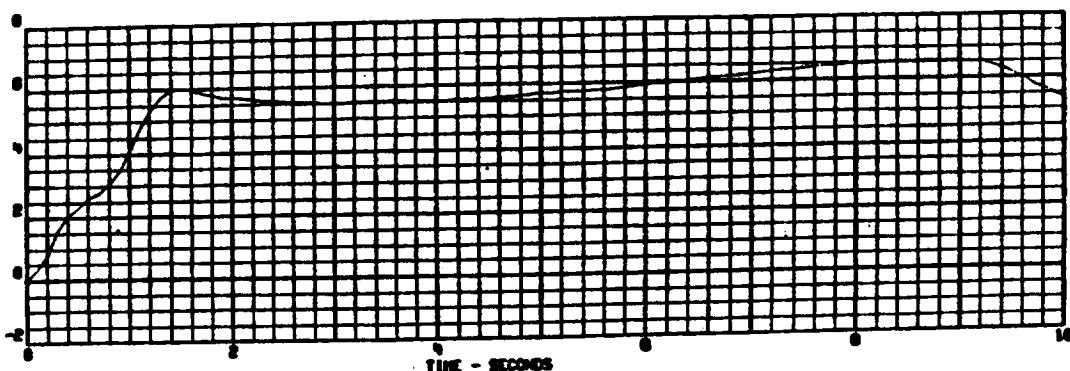
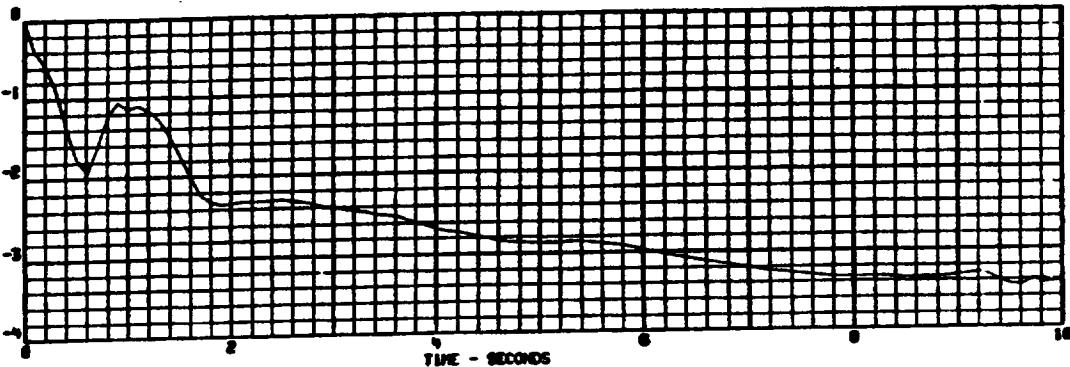
## DOCKING DYNAMICS - CASE NO. = 2B, ORBITER DOCKING, ASTP SYSTEM

91067W0103  
022174 0032



DOCKING DYNAMICS - CASE NO. = 29, ORBITER DOCKING, ASTP SYSTEM

SD 74-CS-0023  
022179 0033

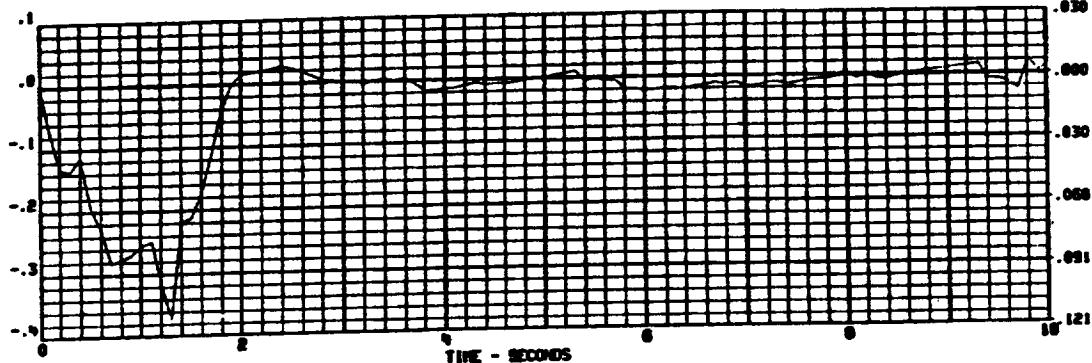




DOCKING DYNAMICS - CASE NO. = 28. ORBITER DOCKING, ASTP SYSTEM

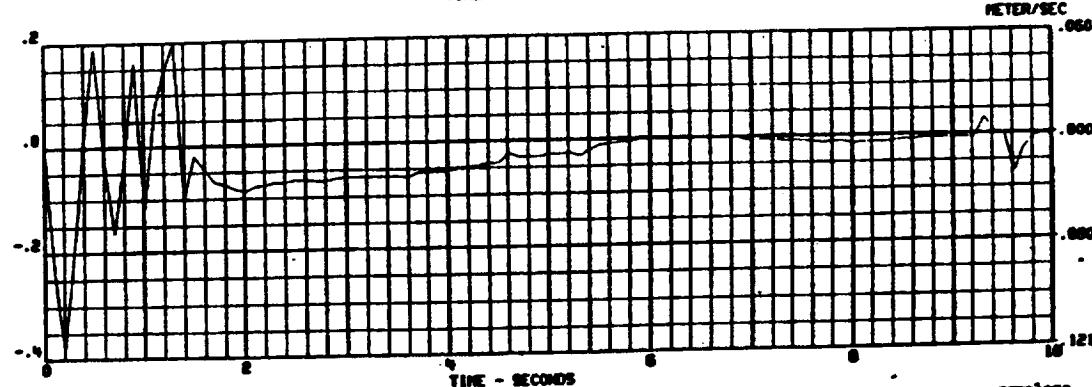
9108740102  
622174 6034

METER/SEC

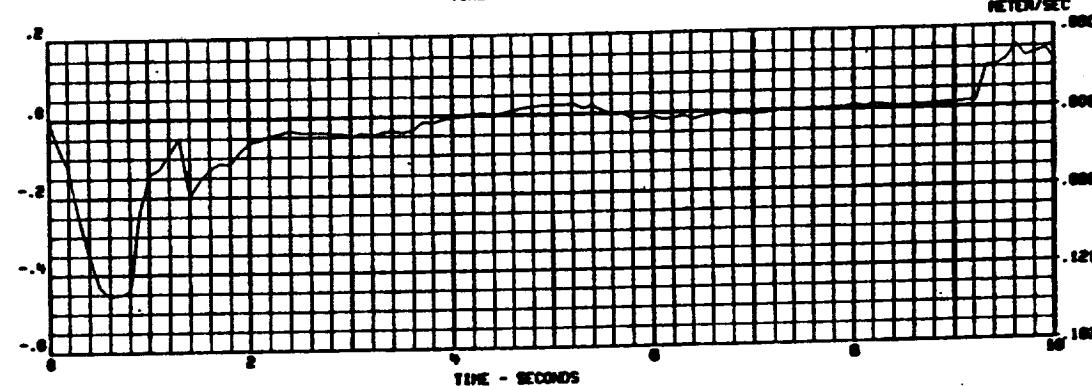


TIME - SECONDS

V  
VX  
VY  
VZ  
F  
FX  
FY  
FZ



TIME - SECONDS

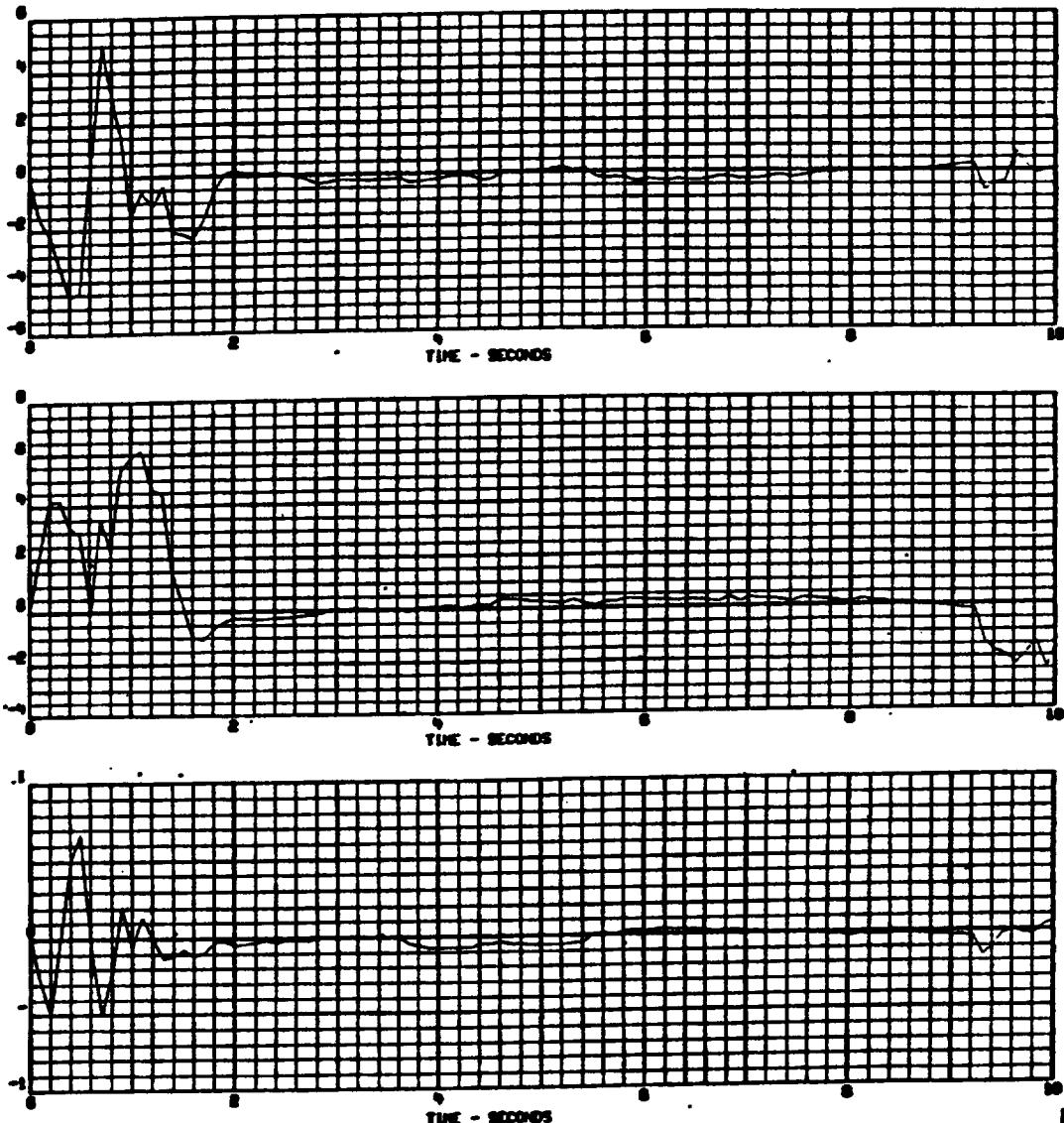


TIME - SECONDS



DOCKING DYNAMICS - CASE NO. = 28, ORBITER DOCKING, ASTP SYSTEM

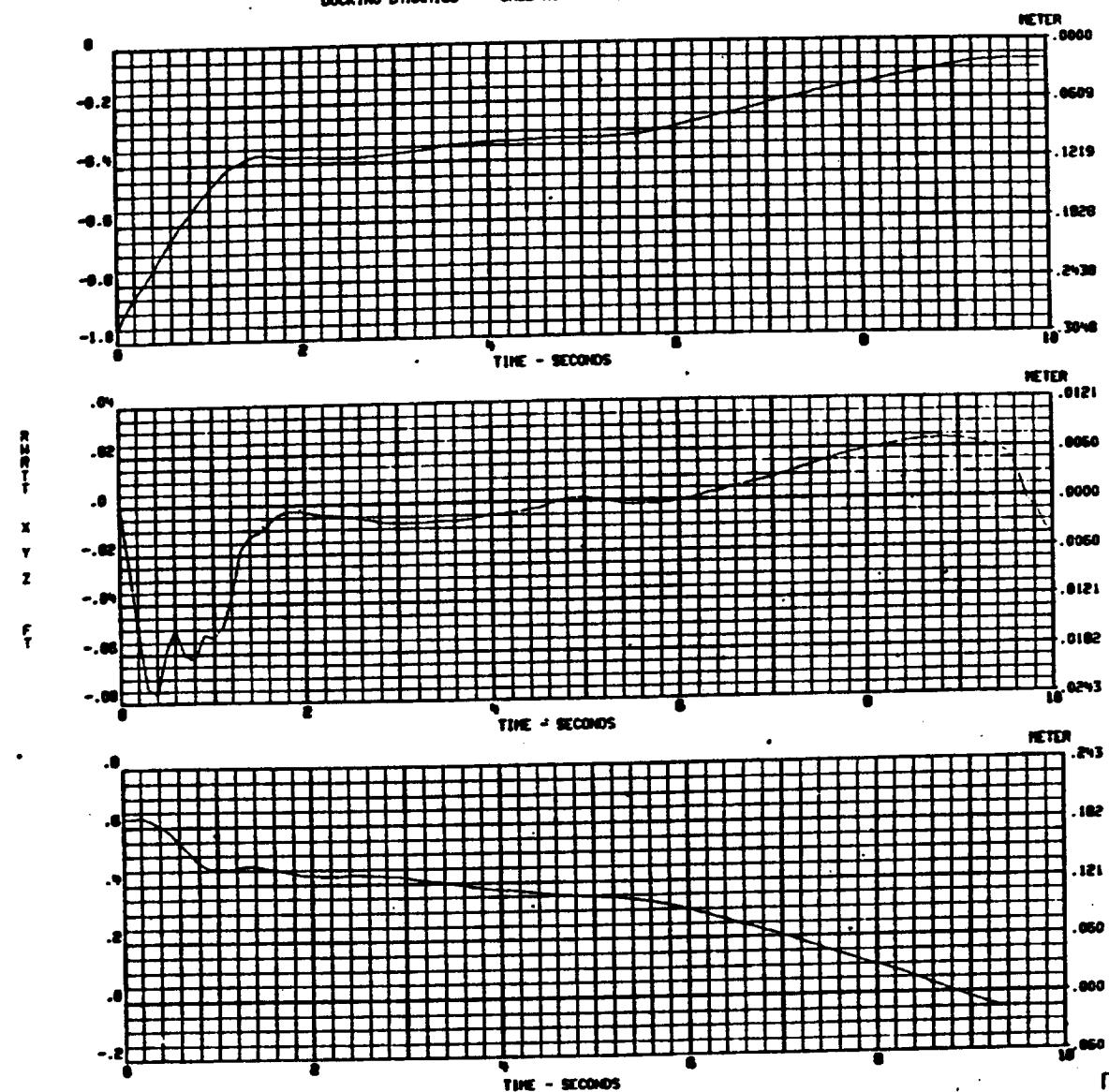
9108740107  
022176 0035  
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DOCKING DYNAMICS - CASE NO. - 28. ORBITER DOCKING, ASTP SYSTEM

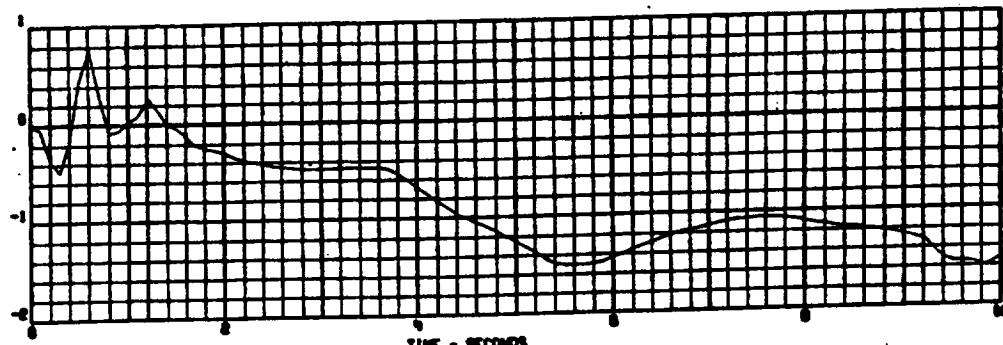
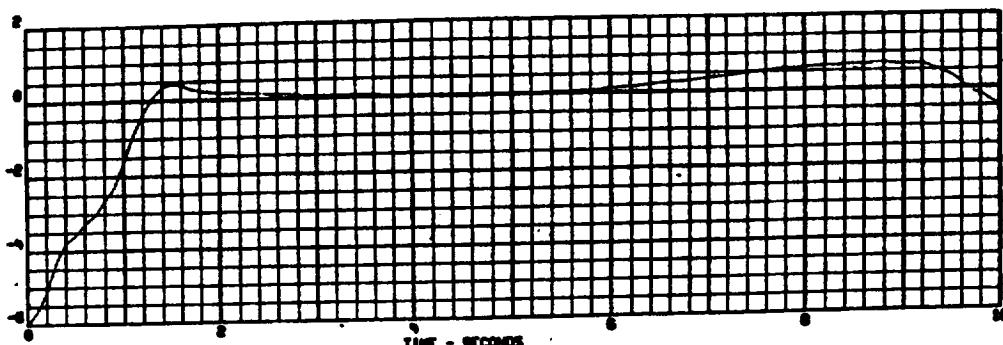
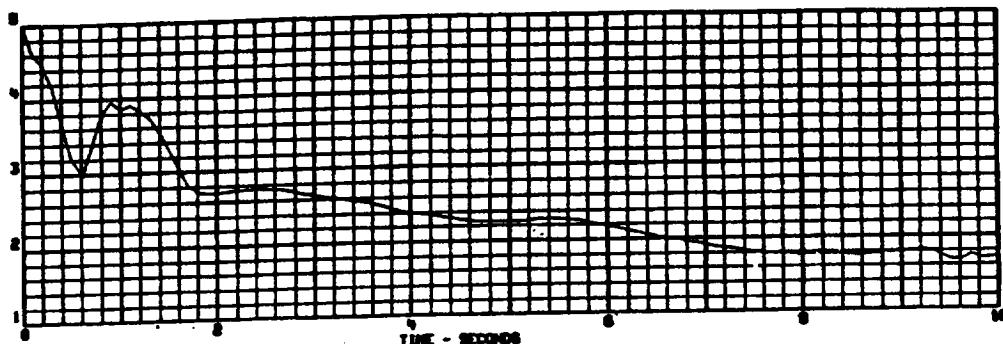
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022174 0036





DOCKING DYNAMICS - CASE NO. = 30. ORBITER DOCKING, ASTP SYSTEM

0100774157  
022170 0037

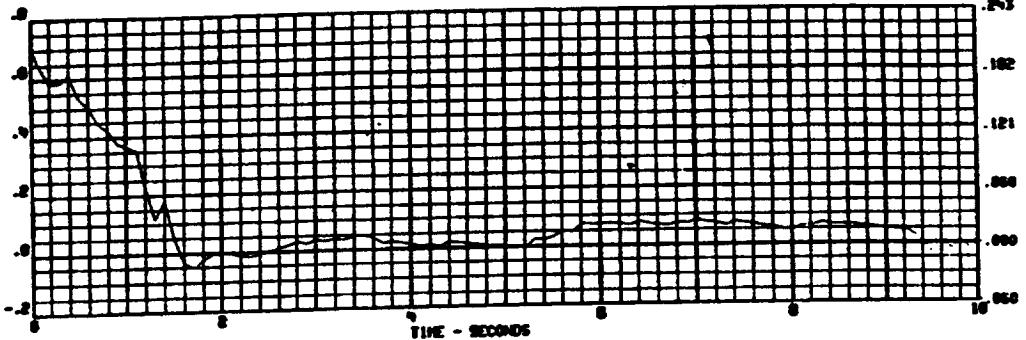




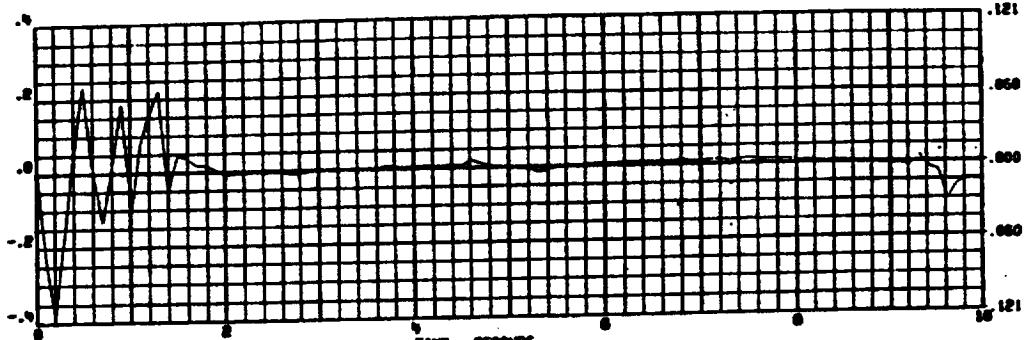
DOCKING DYNAMICS - CASE NO. = 28, ORBITER DOCKING, ASTP SYSTEM

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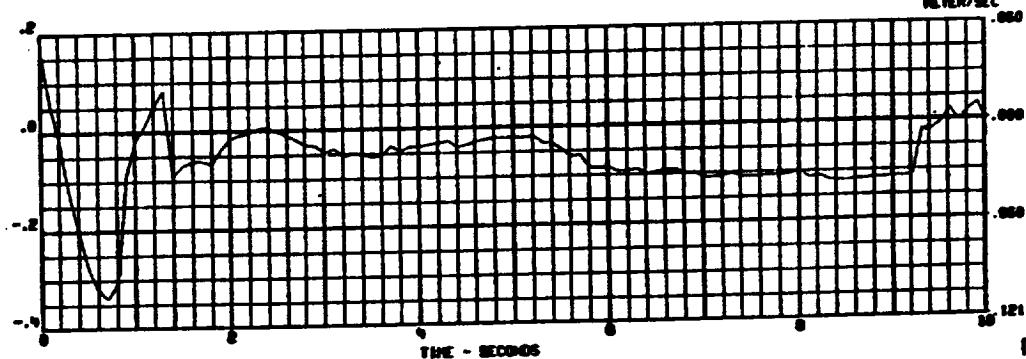
METER/SEC .253



METER/SEC .121



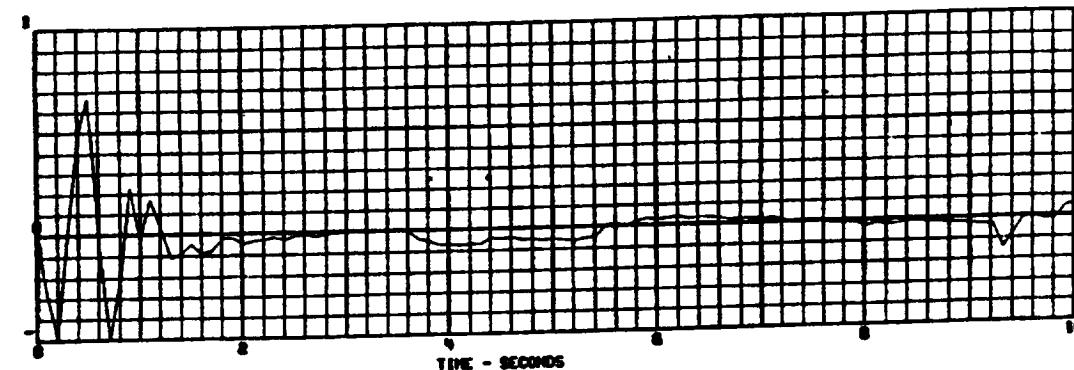
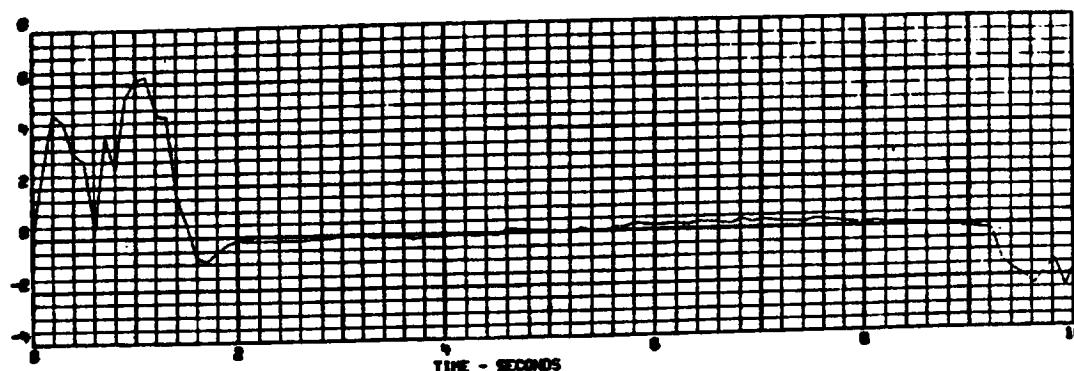
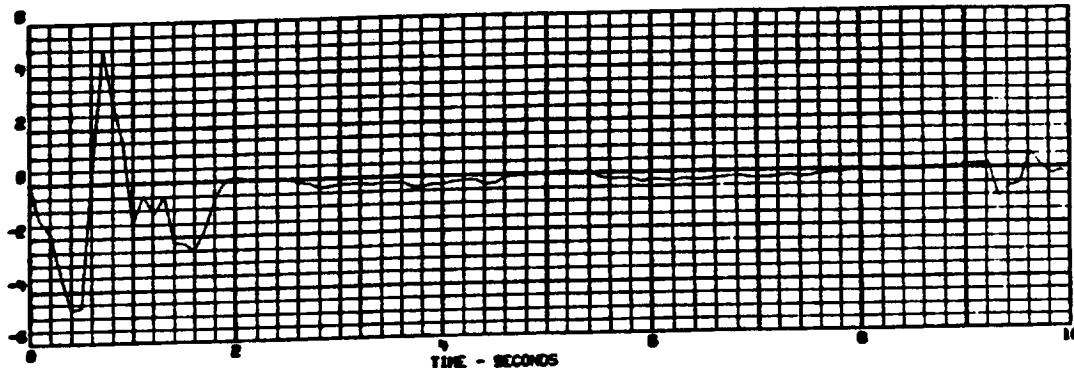
METER/SEC .060





DOCKING DYNAMICS - CASE NO. - 28. ORBITER DOCKING, ASTP SYSTEM

6106740103  
022174 0039  
.....

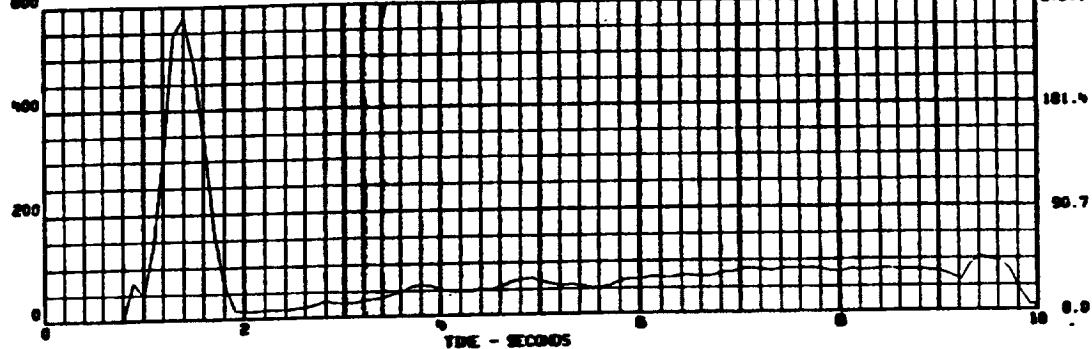




DOCKING DYNAMICS - CASE NO. - 28. ORBITER DOCKING, ASTP SYSTEM

4108740103  
022174 8040

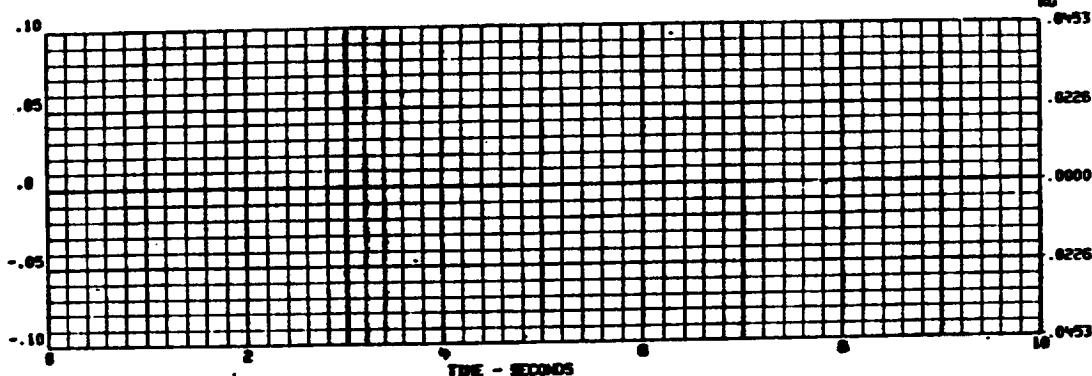
KG  
272.1



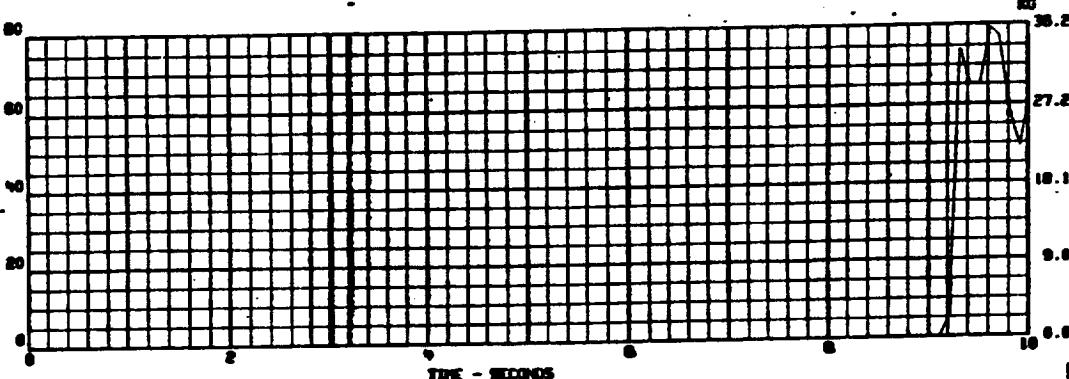
TIME - SECONDS

FORCE  
BETWEEN  
FINGERS

KG  
.0453



TIME - SECONDS

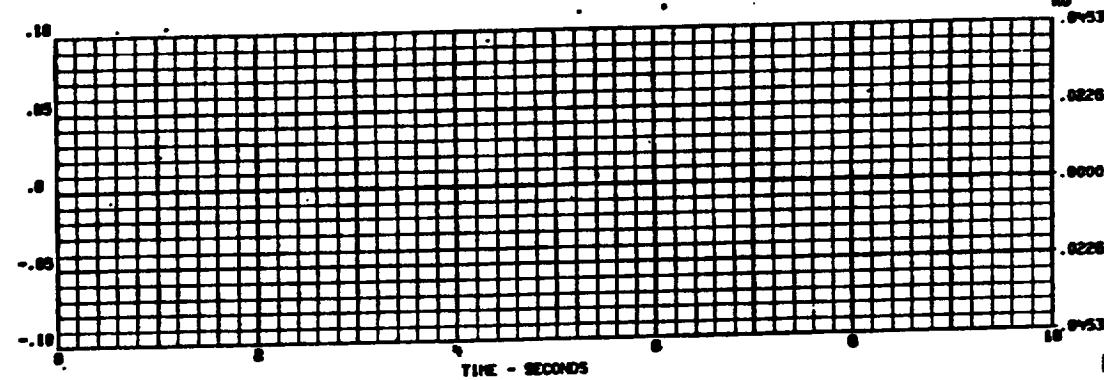
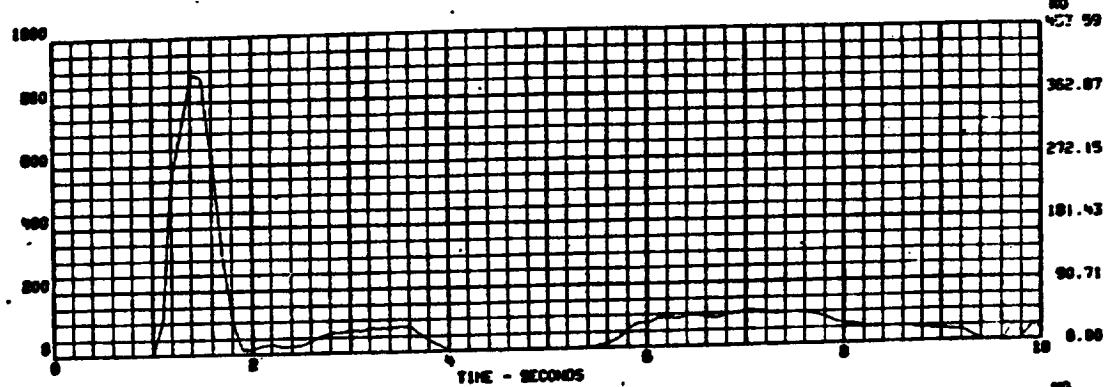
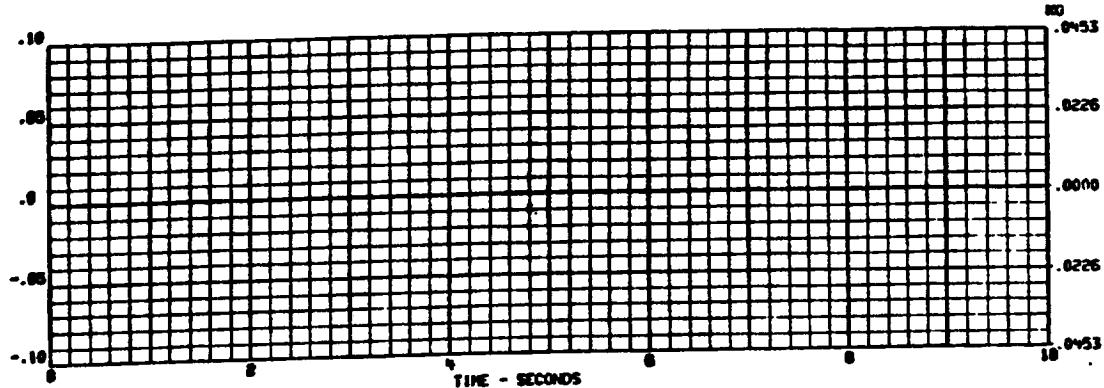


TIME - SECONDS

KG  
36.2

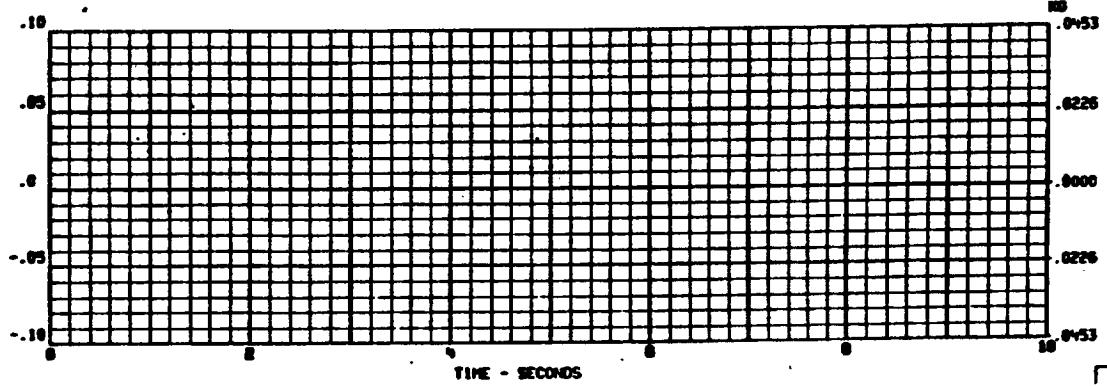
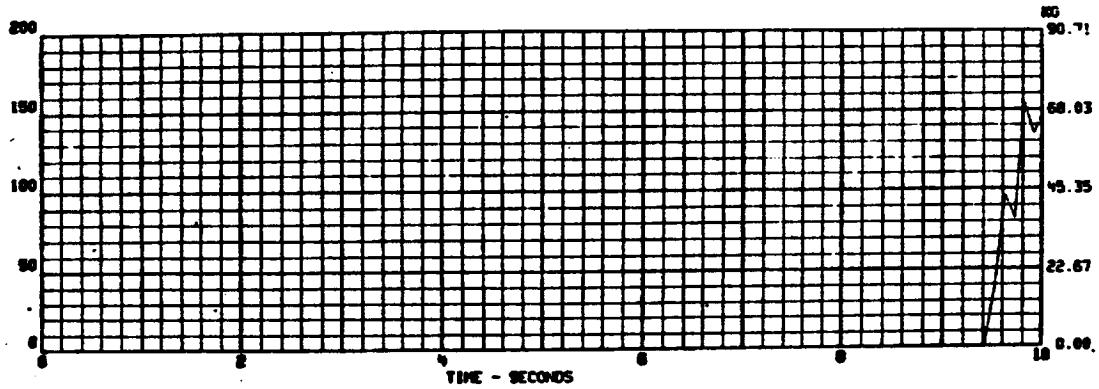
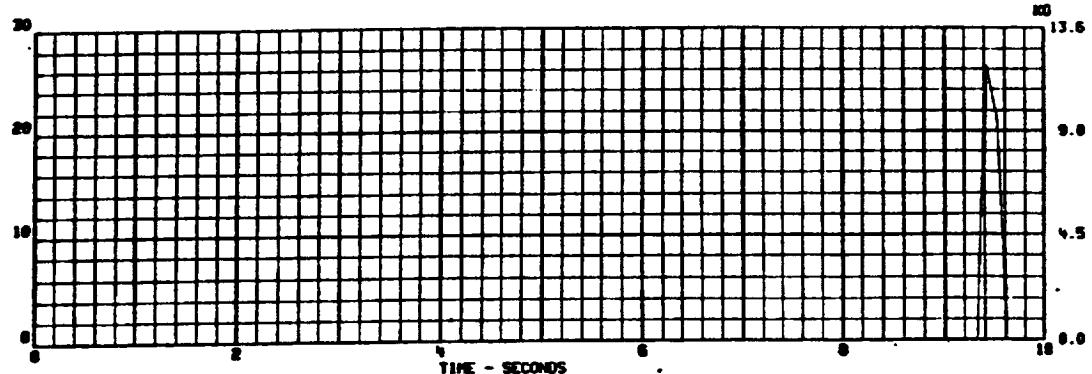


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9108740103  
022174 0041



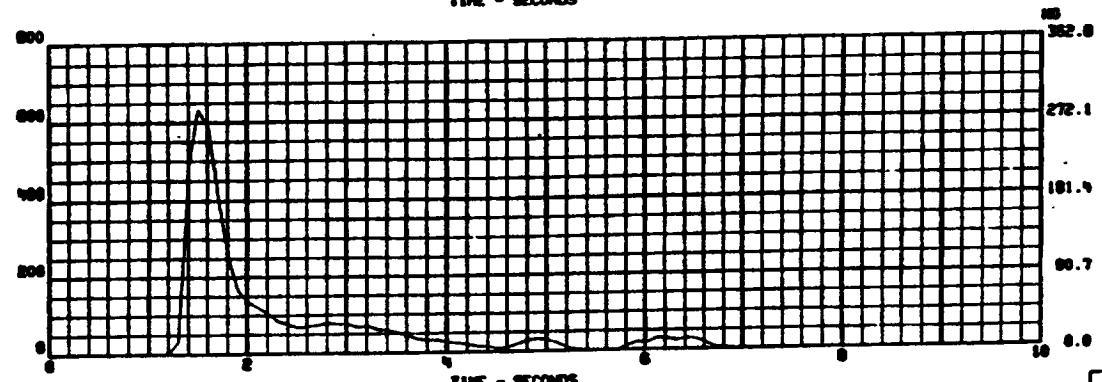
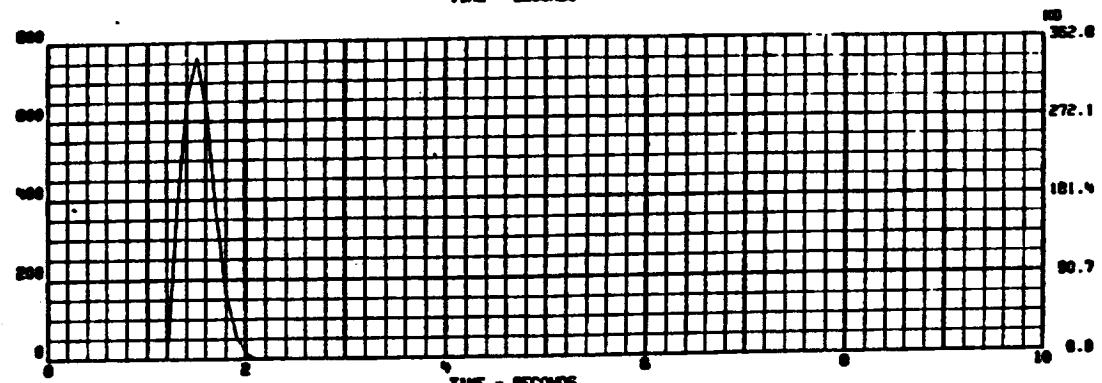
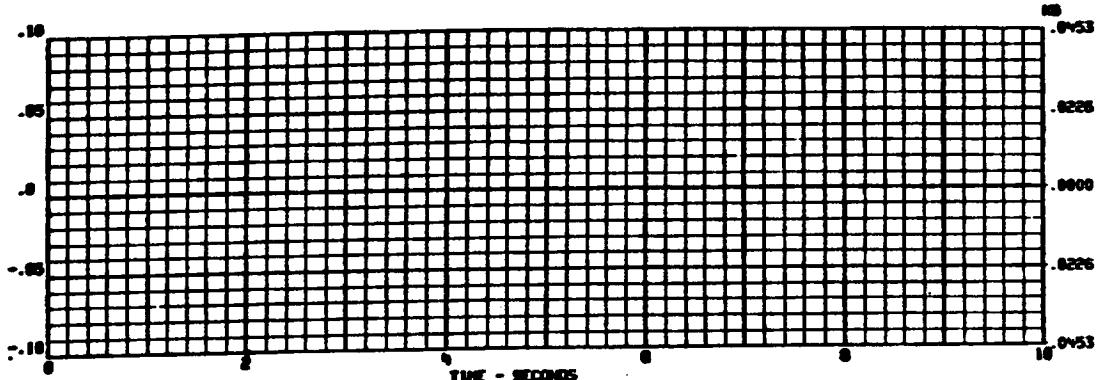
## DOCKING DYNAMICS - CASE NO. • 28. ORBITER DOCKING, ASTP SYSTEM

SD 74-CS-0023  
022174 0042



DOCKING DYNAMICS - CASE NO. = 28. ORBITER DOCKING, ASTP SYSTEM

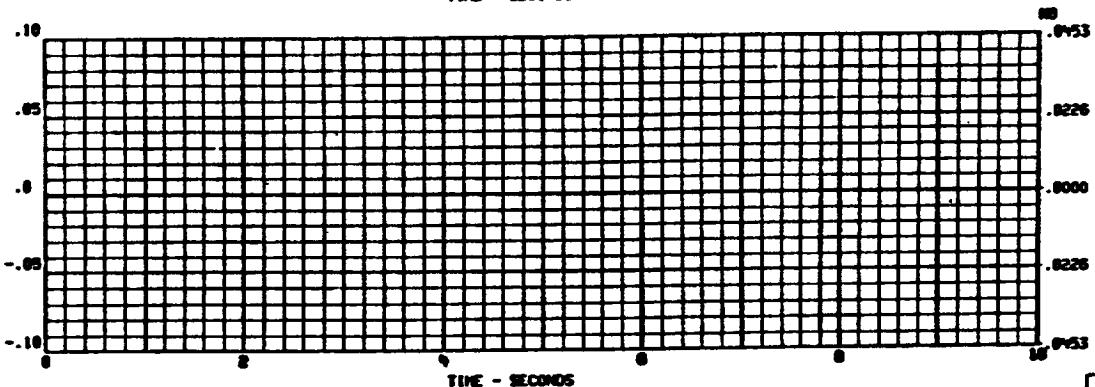
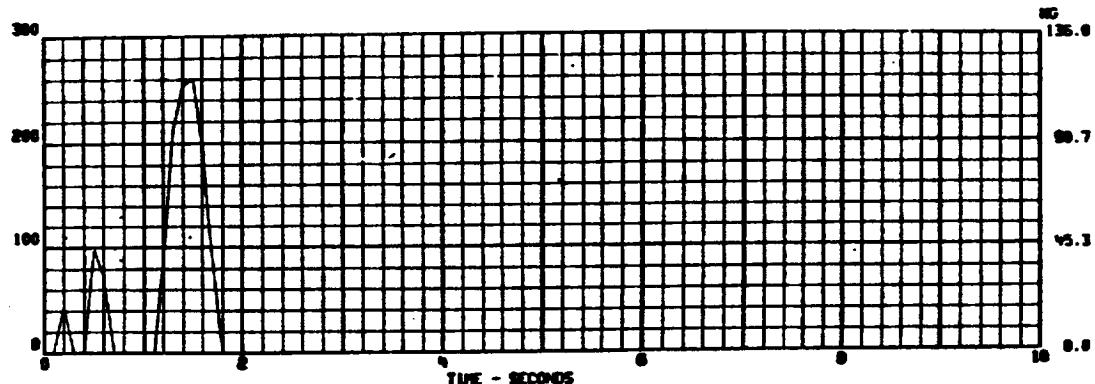
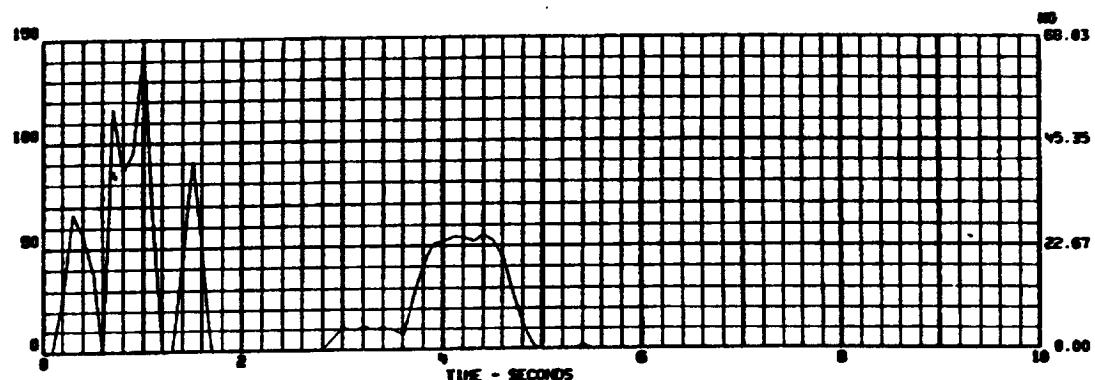
710674-0107  
022174 6043





DOCKING DYNAMICS - CASE NO. - 28, ORBITER DOCKING, ASTP SYSTEM

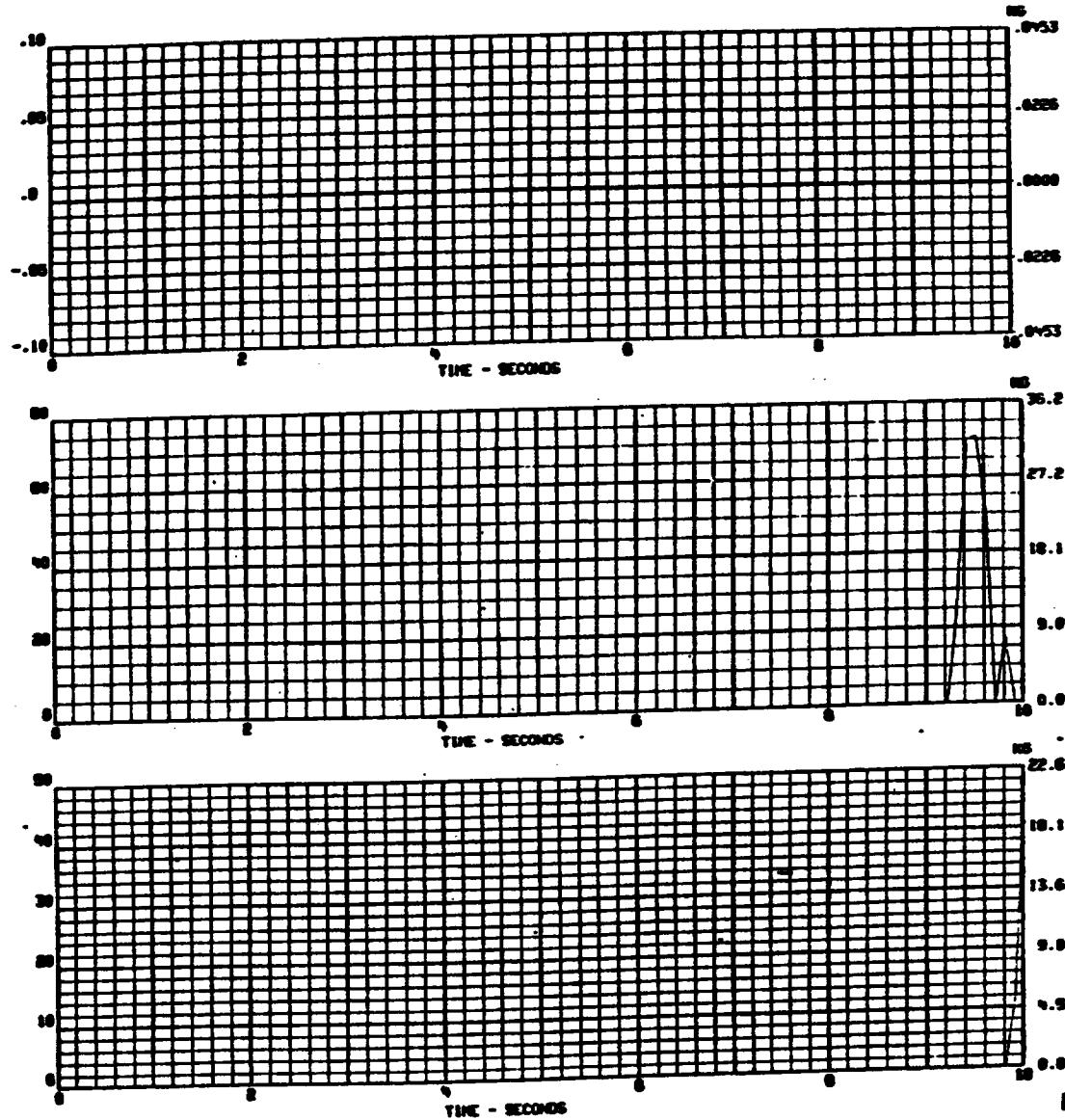
3108790103  
022174 8049





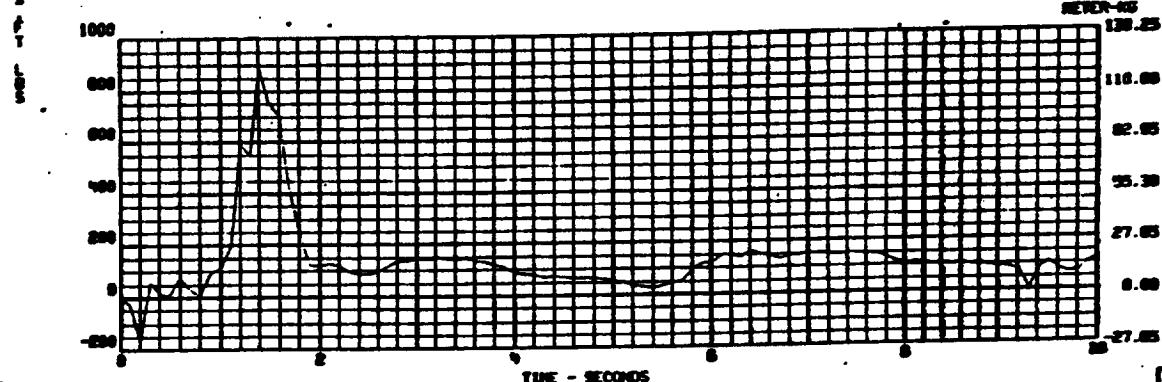
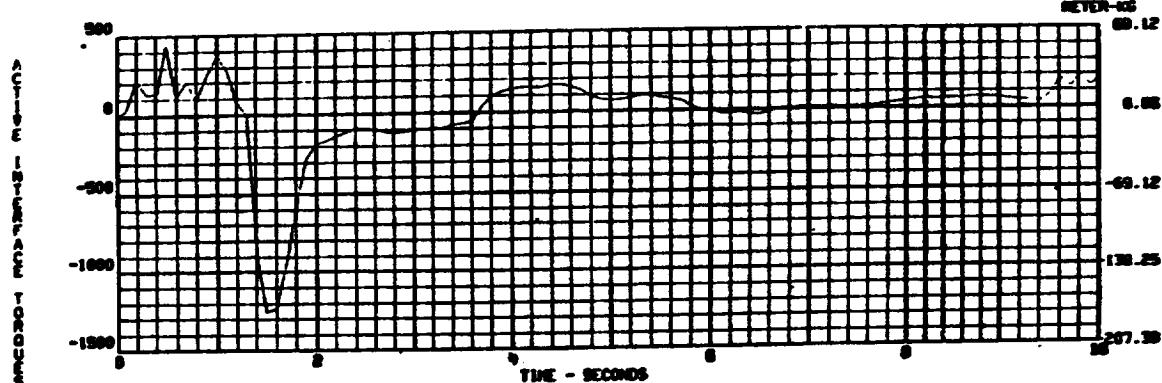
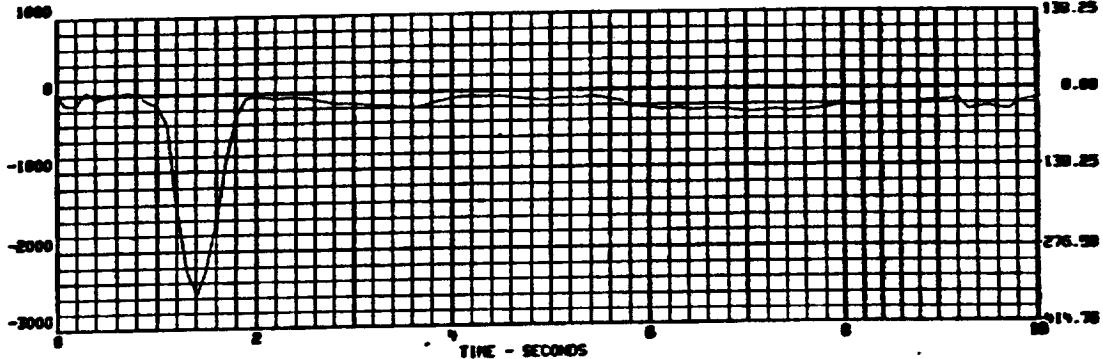
DOCKING DYNAMICS - CASE NO. = 2B, ORBITER DOCKING, ASTP SYSTEM

9100740103  
022170 0005



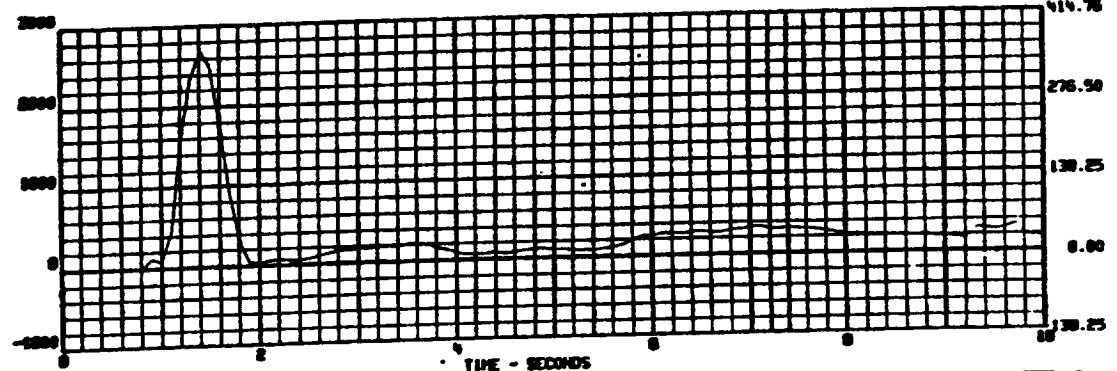


## DOCKING DYNAMICS - CASE NO. = 28, ORBITER DOCKING, ASTP SYSTEM

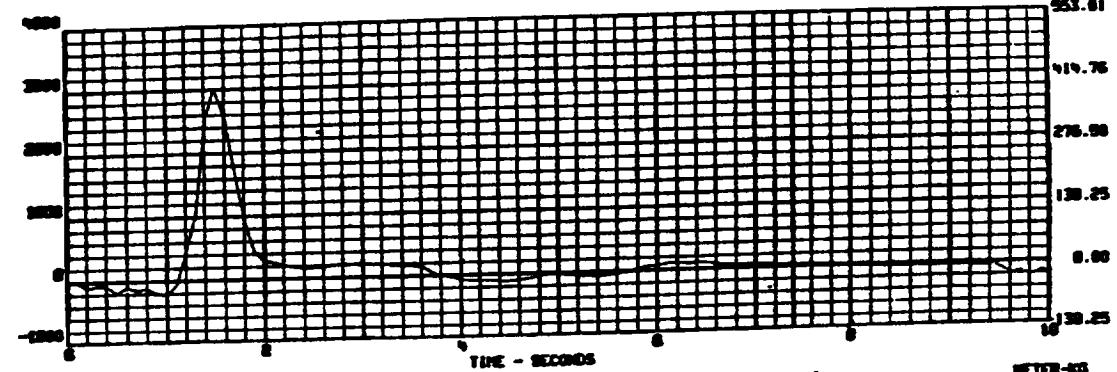
9108740103  
02174 0046NEVER-05  
139.25



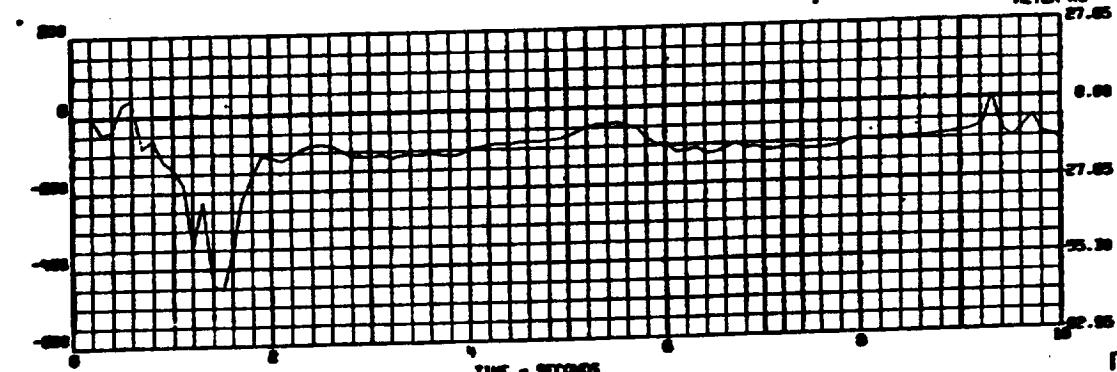
## DOCKING DYNAMICS - CASE NO. = 28, ORBITER DOCKING, ASIP SYSTEM

9105740103  
022170 0047METER-KG  
414.76METER-KG  
253.61

414.76

METER-KG  
27.85

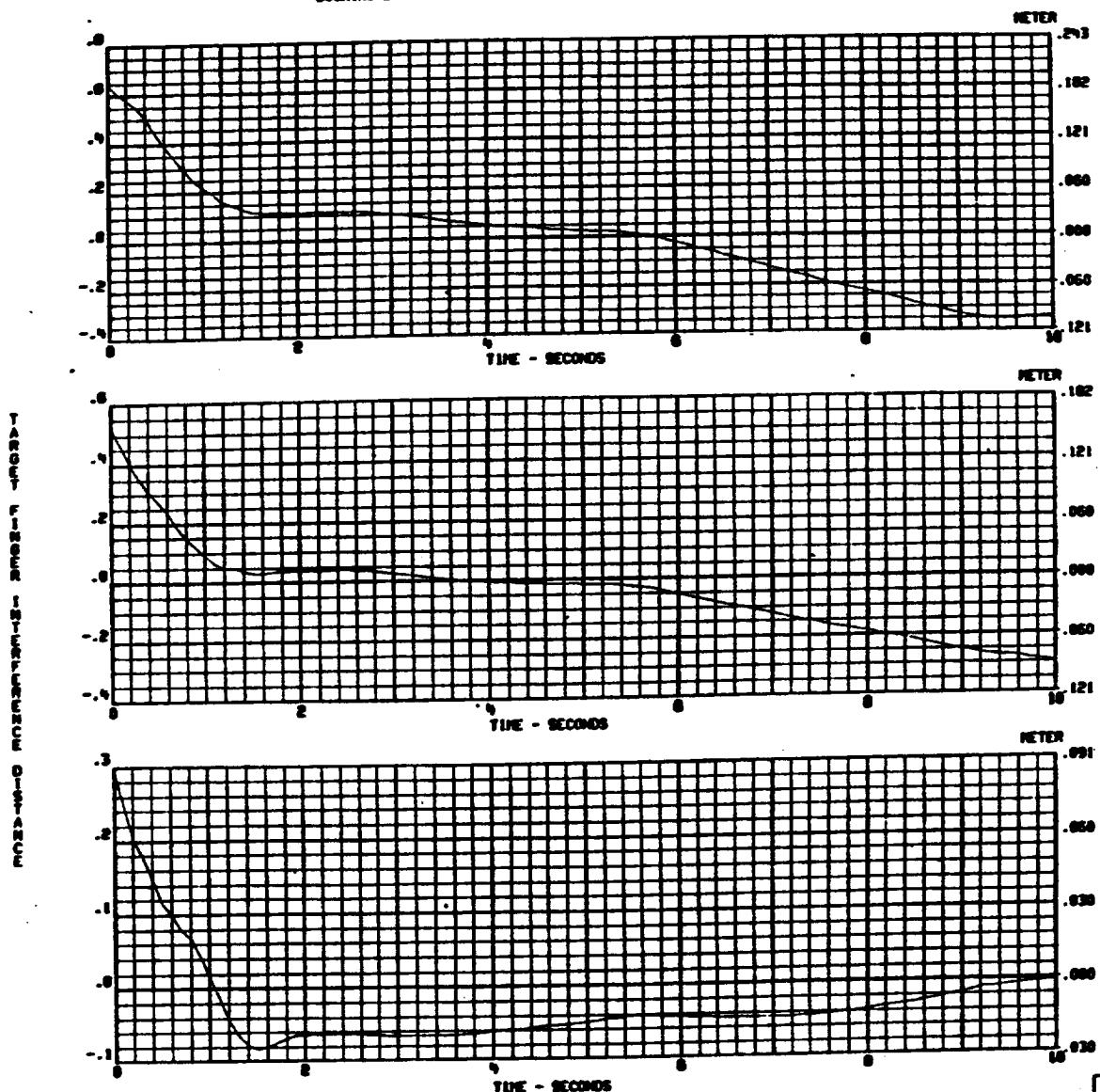
0.00





DOCKING DYNAMICS - CASE NO. = 28, ORBITER DOCKING, ASTP SYSTEM

4108740103  
022174 0048





DOCKING DYNAMICS - CASE NO. - 38. ORBITER DOCKING, ADTP SYSTEM

9100740163  
022174 0049

METER-10

.0130

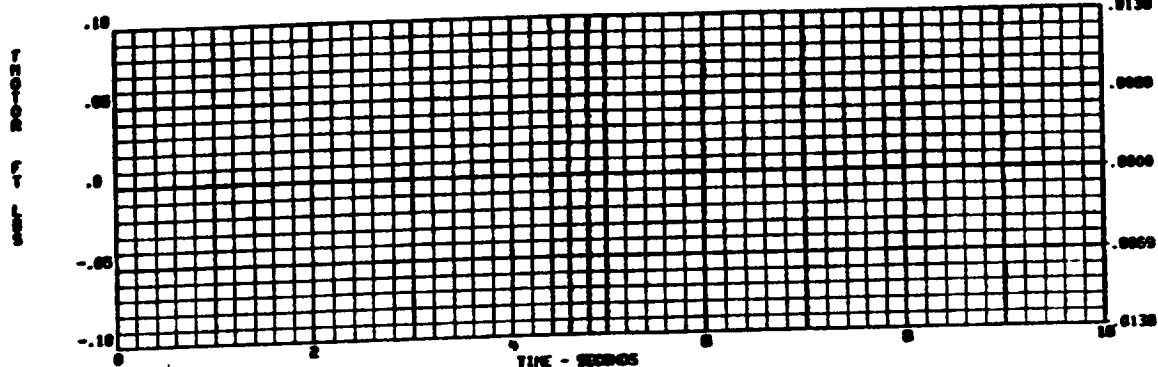
.0000

.0000

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.0000

.0130





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SEND TO      MOUNT      MAIL STOP 81

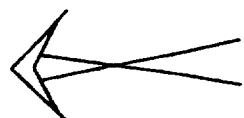
DEPT-GROUP 880-467

41◇X74◇1◇3

BOX NO. 880

DATE 7402

CRT CODES CUT MAG





**PROGRAM FLOW DIAGRAMS**



AUTOFLOW CHART SET

RFCO, FLO

09/22/74

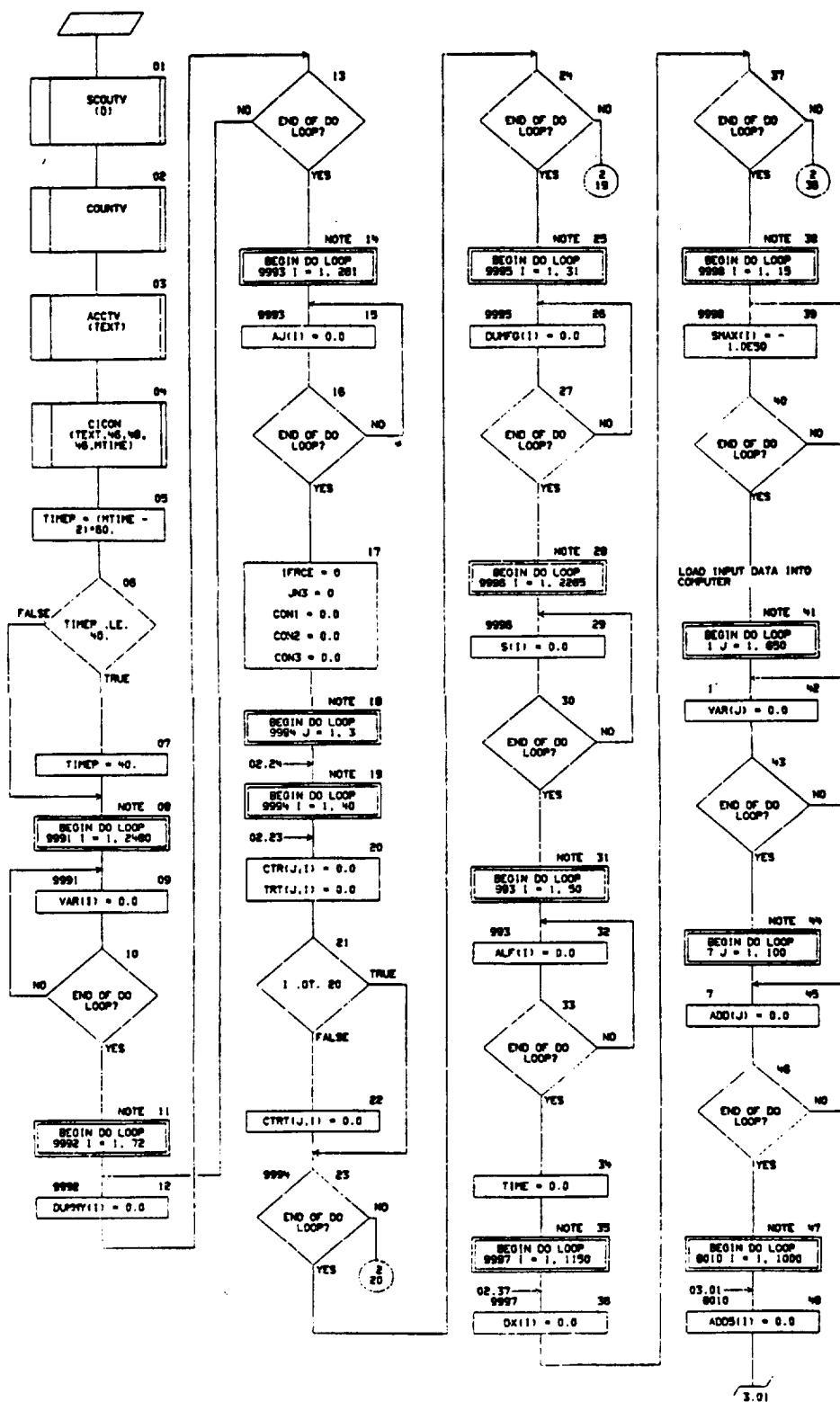
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09/22/79

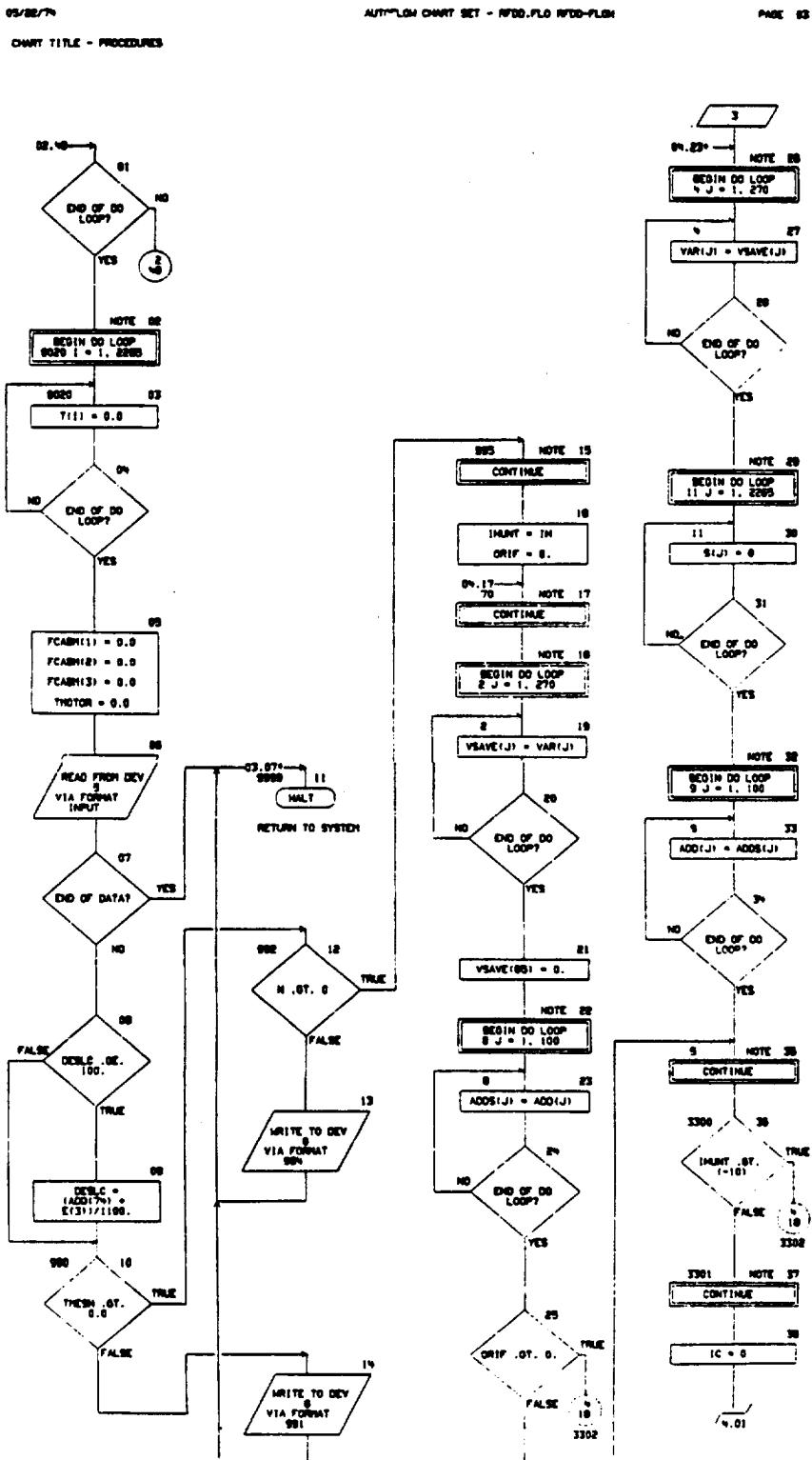
## ALLOCATION CHART SET - RF00.FLO RF00-FLOW

PAGE 28

CHART TITLE - PROCEDURES

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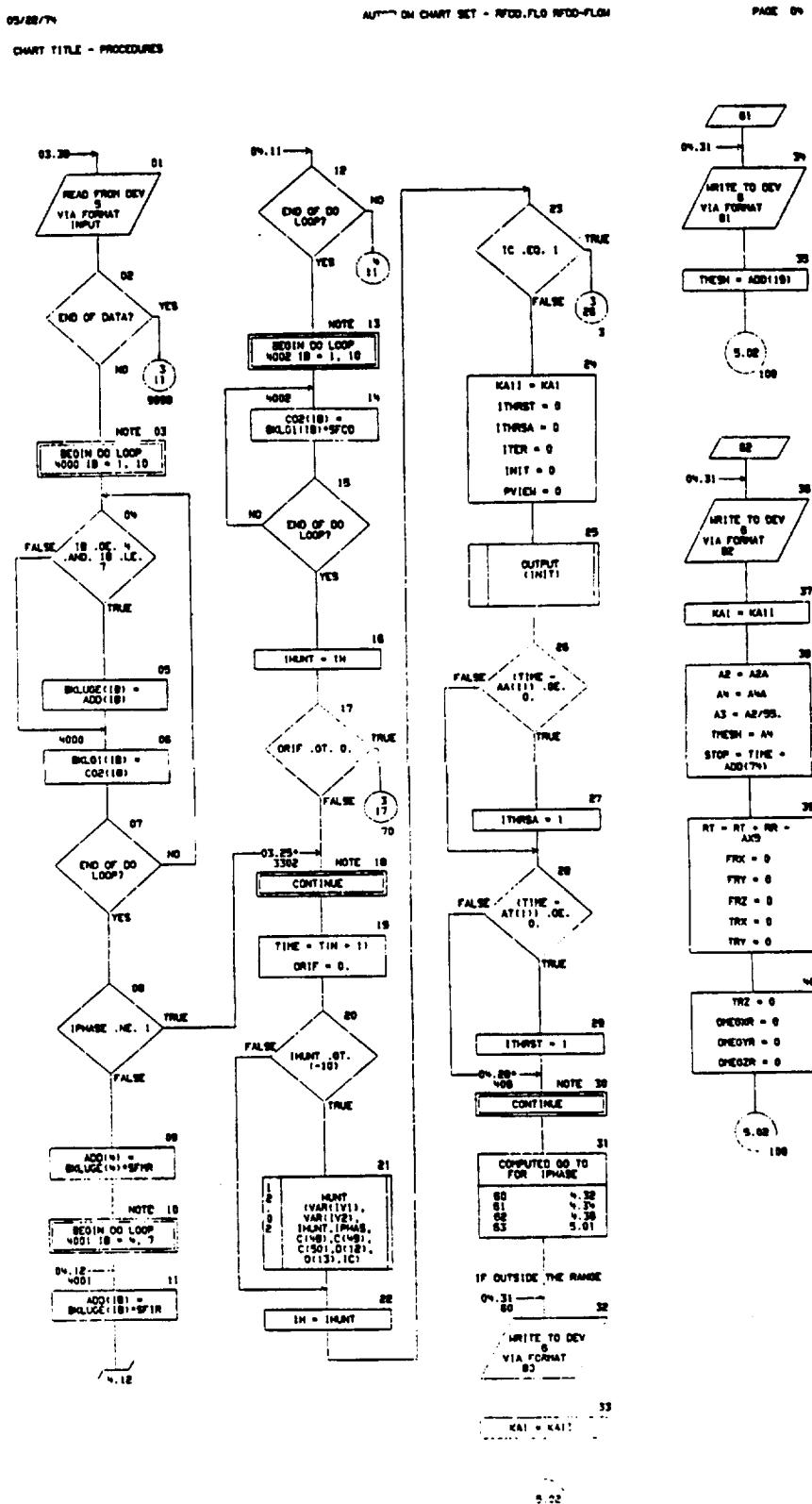
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ROLLOUT FRAME

- 147 -

SD 74-CS-0023

ROLLOUT FRAME





HOLBROOK TRAIL

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3

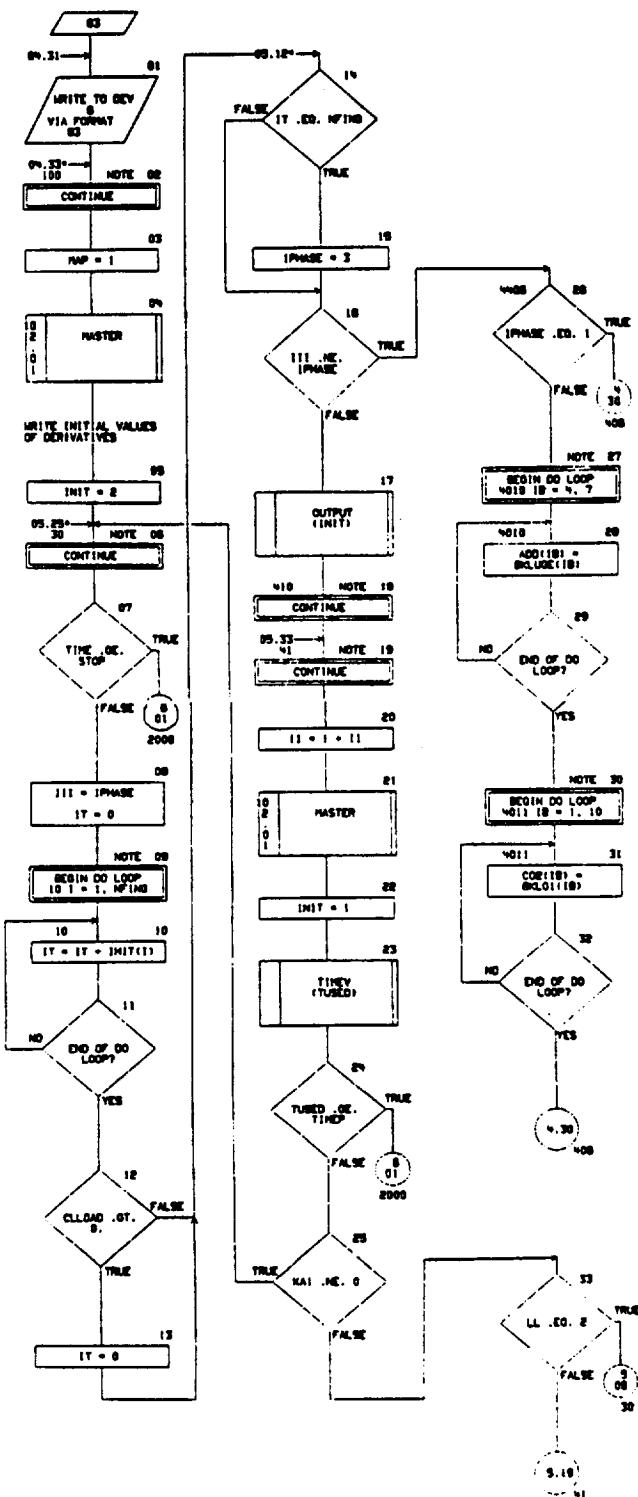
SD 74-CS-0023

THE MUSEUM

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**AUTOPLOT CHART SET - PFD01.PLO PFD02-PLO**

PAGE 60



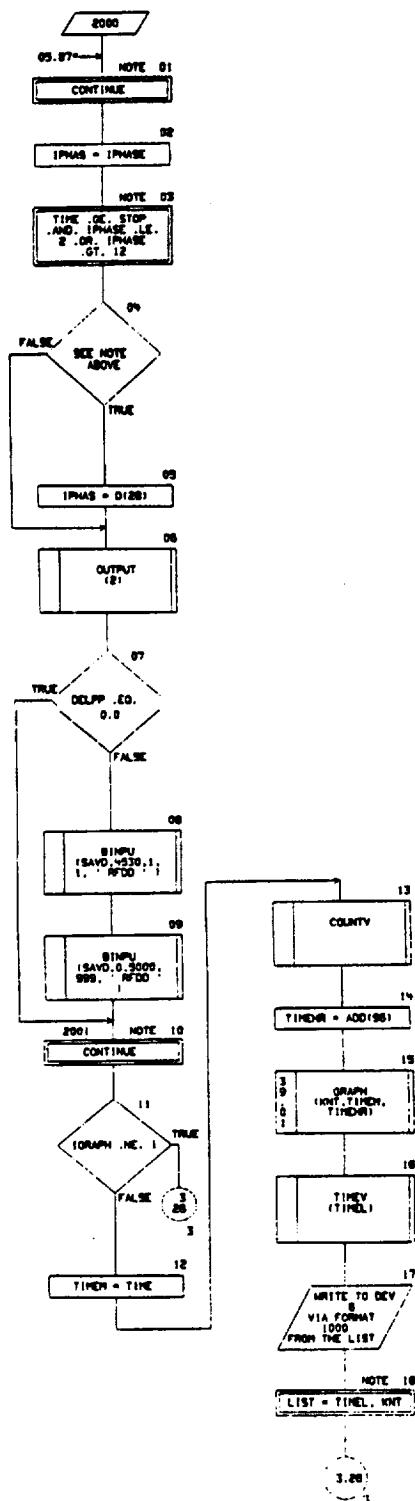


05/22/79

AUT ON CHART SET - RFDD.FLO RFDD-FLOW

PAGE 08

CHART TITLE - PROCEDURES



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- 151 -

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FOLDOUT FRAME 2





## CHART TITLE - NON-PROCEDURAL STATEMENTS

```

DIMENSION BINCLUDE(10),BLOC(110)
EQUIVALENCE (BPNR,BINCLUDE(1)),(BPIR,BINCLUDE(2)),(BPCO,BINCLUDE(3))
DIMENSION VAR(1000),T(1000),AT(10),B(10),C(10),D(10),E(10),F(10),
     AA(10),AT(10),CD(10),BD(10),VSAVE(270)
     S(1000),ADD(100),ADD8(100)
EQUIVALENCE (T(1),XA),(T(2),YA),(T(3),ZA),(T(4),XT),(T(5),YT),
     (T(6),ZT),(T(7),OMDXA),(T(8),OMDYA),(T(9),OMDZA),
     (T(10),OMDXT),(T(11),OMDYT),(T(12),OMDZT),
     (T(13),TMX),(T(14),PMX),(T(15),PMY),(T(16),PTM),
     (T(17),PMY),(T(18),PTM),(T(19),PM),(T(20),YM),
     (T(21),ZP),(T(22),XD),(T(23),YD),(T(24),ZD),
     (T(25),XD),(T(26),YD),(T(27),ZD),(T(28),XD),
     (T(29),YD),(T(30),ZD),
     (OK(10),PM),
     (OK(30),PM),(OK(60),PM),(OK(70),PM),(OK(80),PM),
     (OK(90),PM),(OK(100),PM)
COMMON/CPLX/TIME,DX(100),ADD8(1000)
DIMENSION BUNRT(1),BUNRF(1)
EQUIVALENCE (BUNRT(1),BAM(1)),(BUNRF(1),FB)
EQUIVALENCE (A(1),XMA),(A(2),XXIA),(A(3),YYIA),(A(4),ZZIA),
     (A(5),XYIA),(A(6),XZIA),(A(7),YZIA),(A(8),OFXIA),
     (A(9),OFYIA),(A(10),OFZIA)
EQUIVALENCE (B(1),BMX),(B(2),BMT),(B(3),BXT),(B(4),BYT),(B(5),BZT),
     (B(6),BYT),(B(7),BZT),(B(8),YD),(B(9),OFUT),
     (B(10),OFUT),(B(11),RT)
     ,IC(21),CLLOAD1
     ,IC(21),MATTION
     ,IC(17),ISIMP1
     ,ID(20),IV1),(ID(30),IV2)
EQUIVALENCE (E(1),IPMAX),(E(2),STOP),(E(3),DELP),(E(4),CASE),
     (E(5),IOPAP),(E(6),DOLP),(E(7),DESLC),(E(8),JH),
     (E(9),ICASE)
EQUIVALENCE (F(1),THEM),(F(2),H),(F(3),A),(F(4),A),(F(5),A),(F(6),KA),
     (F(7),AB),(F(8),AN),(F(9),AT)
     ,(F(1),ABA),(F(2),ANA)
     ,(ADD(1),AR),(ADD(11),AR5),(ADD(10),MFIND),(B(45),INIT)
     11
DIMENSION INIT(100)
EQUIVALENCE (D(1),ORIF),(D(10),IN)
COMMON/PCR/TRY,TRY,TR2,TRY,TRY,TRY2
EQUIVALENCE (AA(1),THCOMA),(AA(2),PHCOMA),(AA(3),PCOMA),
     (AA(4),ARCA),(AA(5),ARYA),(AA(6),ARZA),(AA(7),ADPA),
     (AA(8),ADTHA),(AA(9),ADPA),(AA(10),ADPA),(AA(11),TXA),(AA(12),TYA),
     ,(AA(13),ZTA),(AA(14),DBANHA),(AA(15),DBANYA),
     ,(AA(16),DBANZA),(AA(17),PM),(AA(18),REACTA),
     ,(AA(19),BANKA),(AA(20),BANYA),(AA(21),BANZA),
     ,(AA(22),TR)
EQUIVALENCE (AT(1),DROR),(AT(2),DRK),(AT(3),TRCST),(AT(4),DRK),
     (AT(5),ARCT),(AT(6),ARVT),(AT(7),ARZT),(AT(8),ADPT),
     (AT(9),ADTH),(AT(10),ADPT),(AT(11),DRGHT),(AT(12),DBANHT),
     ,(AT(13),DBANHT),(AT(14),DBANHT),(AT(15),THEC),
     ,(AT(16),PHCOT),(AT(17),PCOMT),(AT(18),REACT),
     (AT(19),BANKT),(AT(20),BANKT),(AT(21),BANKT),
     ,(AT(22),TXT),(AT(23),TYT),(AT(24),TZT),(AT(25),FTT),
     ,(AT(26),PMXT),(AT(27),PMXT),(AT(28),PMXT),
     ,(AT(29),INC8),(AT(30),IVD)
     ,(B(31),THBRA),(B(32),TRBRT),(B(33),TRBLD),(B(34),TRBLD)
EQUIVALENCE (VAR(1),AT(1)),(VAR(10),B(1)),(VAR(30),C(1)),
     ,(VAR(101),B(11)),(VAR(101),C(11)),(VAR(105),F(11)),
     ,(VAR(109),AA(11)),(VAR(109),AT(11)),(VAR(109),CO(11)),
     ,(VAR(201),BB(11)),(VAR(201),T(11))
COMMON VAR
COMMON/PP/MAP,L

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153 -

SD 74-CS-0023

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AUTOM. CHART SET - RFDD.FLG RFDD-FLOW

PAGE 68

**CHART TITLE - NON-PROCEDURAL STATEMENTS**

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BUREAU OF INVESTIGATION

551

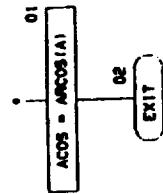
SD 74-CS-0023





09/22/74  
CHART TITLE - FUNCTION ACOS(1)

RING FINGER DOCKING  
DYNAMICS (INFO) ALMANAC  
NR VERS (INFO) ALMANAC  
MOUNT 005/408  
372-1953



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- 157 -

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PAGE 11

AUTM-1A CHART SET - WFO, FLO WFO-FLOW

05/22/74

CHART TITLE - NON-PROCEDURAL STATEMENTS

DIMENSION A(1), B(3)

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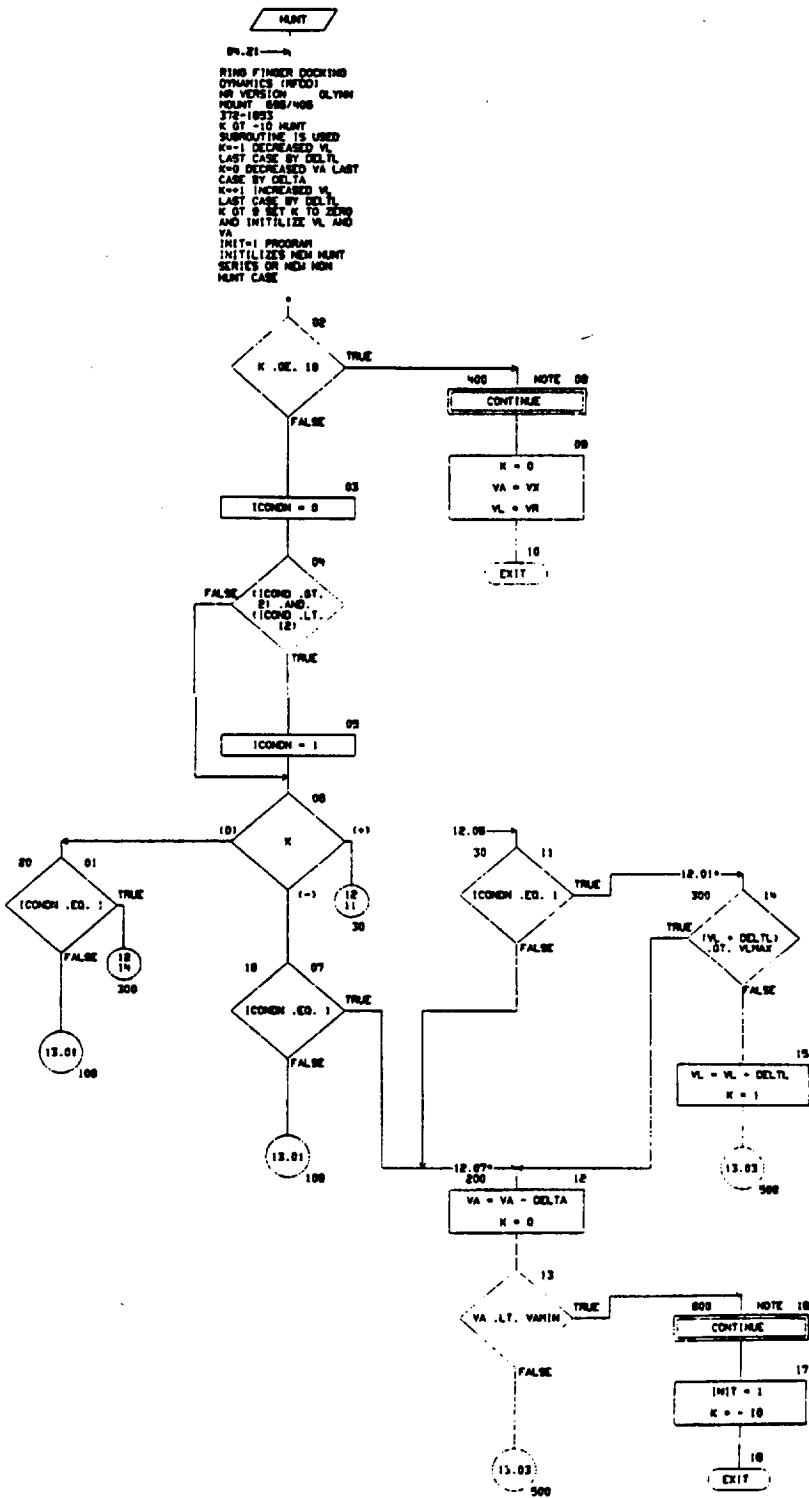
CHART TITLE - SUBROUTINE HUNTVN,VR,X,ICOND,VURN,VMAX,VANIN,DELTL,INIT

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SD 74-CS-0023





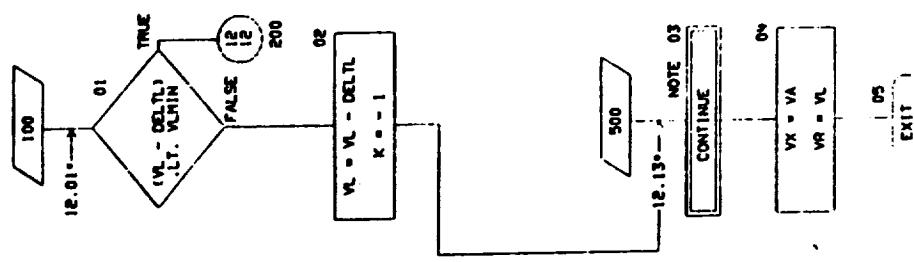


PAGE 13

ALTR...ON CHART SET - RFDO, FLO, RFDO-FLOW

05/22/79

CHART TITLE - SUBSTITUTE: MANTAIN VR X 1000, VR MAX, VRIN, DELTA, INITI



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SD 74-CS-0023



CHART TITLE - INTRODUCTORY COMMENTS

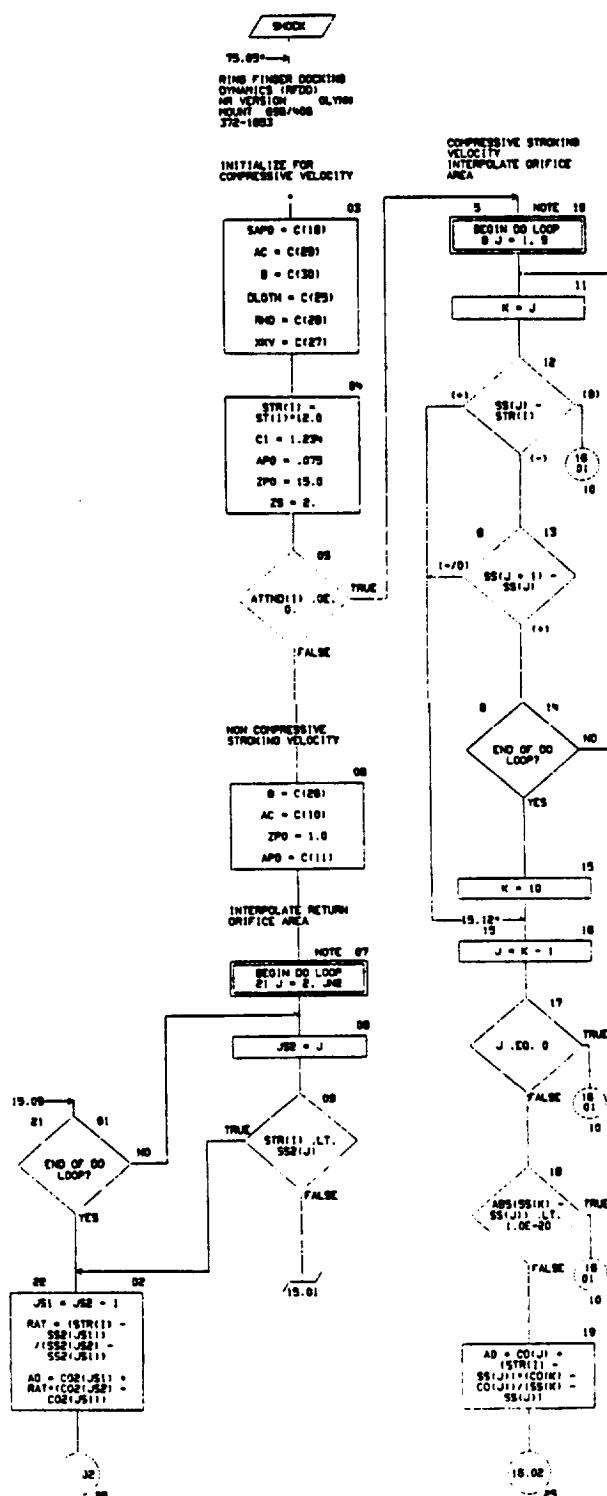
DK1	= KINETIC TERM FOR VISCOUS FLOW IN ORIFICE	
RHO	= MASS DENSITY	LBS/SEC <sup>3</sup> /IN <sup>3</sup>
XXV	= KINEMATIC VISCOSITY	IN <sup>2</sup> /IN/SEC
S	= METERING PIN OR RETURN AREA	
AC	= ATTENUATOR CYLINDER OR RETURN AREA	
DOLN	= ORIFICE LENGTH	IN.
ST	= STROKE POSITION ARRAY	IN.
ATND	= ATTENUATOR STROKING VELOCITY (= FOR COMPRESSION)	IN.
AS	= STROKE DISPLACEMENT	IN.
AVD	= STROKE VELOCITY	IN./SEC.
JNR	= NUMBER OF POINTS IN RETURN ORIFICE TABLE	
SRZ	= RETURN ORIFICE STROKE	
COR	= RETURN ORIFICE AREA	
SS	= ATTENUATOR STROKE	
CO	= ATTENUATOR ORIFICE AREA	
SP	= SPRING LOAD PLUS FRICTION LOAD	LBS.
AO	= AREA OF MAIN ORIFICE	IN. <sup>2</sup> .
AP0	= PISTON HEAD ORIFICE AREA	IN. <sup>2</sup> .
SAP0	= ACCUMULATOR PISTON ORIFICE	IN. <sup>2</sup> .
AB5	= WIDTH OF ORIFICE	IN.
RHOD	= HYDRAULIC RADIUS	IN.
V0	= VELOCITY OF OIL AT MAIN ORIFICE	IN./SEC.
V05	= VELOCITY OF OIL AT ACCUMULATOR PISTON	IN./SEC.
RE	= REYNOLDS NUMBER AT PISTON HEAD AND MAIN ORIFICE	
REC	= REYNOLDS NUMBER AT ACCUMULATOR PISTON	
Z	= LENGTH TO WIDTH RATIO OF MAIN ORIFICE	
ZS	= LENGTH TO WIDTH RATIO OF ACCUMULATOR PISTON ORIFICE	
ZP0	= LENGTH TO WIDTH RATIO OF PISTON HEAD AT ORIFICE	
F	= FRACTION OF MAXIMUM PRESSURE RECOVERY DUE TO STREAM EXPANSION FOR MAIN ORIFICE	
FS	= FRACTION OF MAXIMUM PRESSURE RECOVERY DUE TO STREAM EXPANSION FOR ACCUMULATOR PISTON	
FPP	= FRACTION OF MAXIMUM PRESSURE RECOVERY DUE TO STREAM EXPANSION FOR PISTON HEAD	
DC	= DISCHARGE COEFFICIENT FOR MAIN ORIFICE	
DCS	= DISCHARGE COEFFICIENT FOR ACCUMULATOR PISTON	
DCP	= DISCHARGE COEFFICIENT PISTON HEAD	
FP	= FRICTION FACTOR FOR ANNULI OF FINE CLEARANCE AND FOR PARALLEL PLATES FOR MAIN ORIFICE AND PISTON HEAD	
FPS	= FRICTION FACTOR FOR ANNULI AND FINE CLEARANCE AND FOR PARALLEL PLATES FOR ACCUMULATOR PISTON	
PMA	= TOTAL HYDRAULIC LOAD IN ATTENUATOR	LBS.
PHAI	= HYDRAULIC LOAD IN ATTENUATOR AT PREVIOUS TIME	
PHAS	= ACCUMULATOR PISTON HYDRAULIC LOAD	LBS.
PHAP	= HYDRAULIC LOAD AT PISTON HEAD	LBS.

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CHART TITLE - SUBROUTINE SHOCKST,ATHD,C,FAD,I,FVRCP,FVRCM





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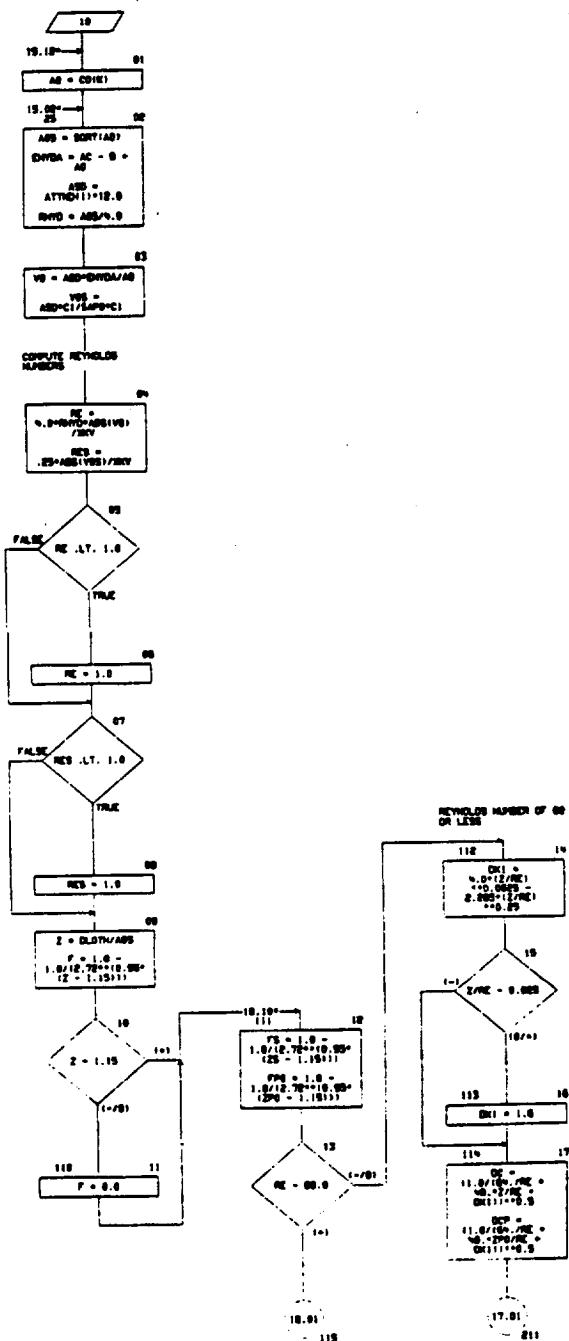
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- 165 -

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FOLDOUT 2

18

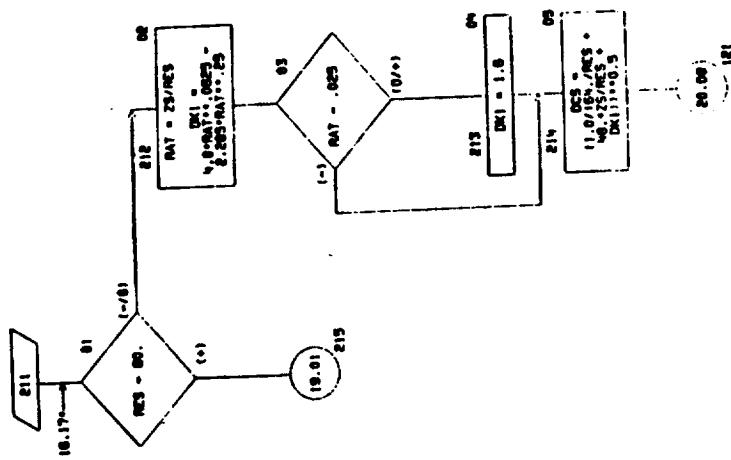






PAGE 17

APPLN CHART SET - RFDL.RD PROJ-1  
CHART TITLE - SUBROUTINE SICK1ST, ATROG.C, FAO, 1, FFDLCP, FFDLCP  
09/22/77



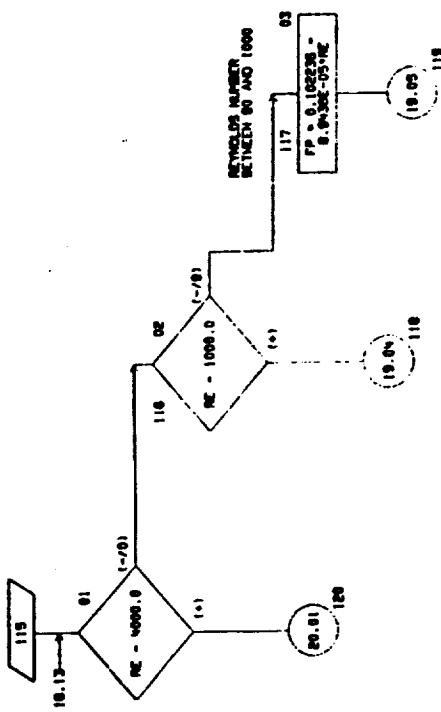
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PAGE 10

09/22/74 CHART SET - RPD0, PL0, RPD0-PL0  
CHART TITLE - SUBROUTINE: SICKST, ATMO.C, FAD, I, PRINCIP, PRCP

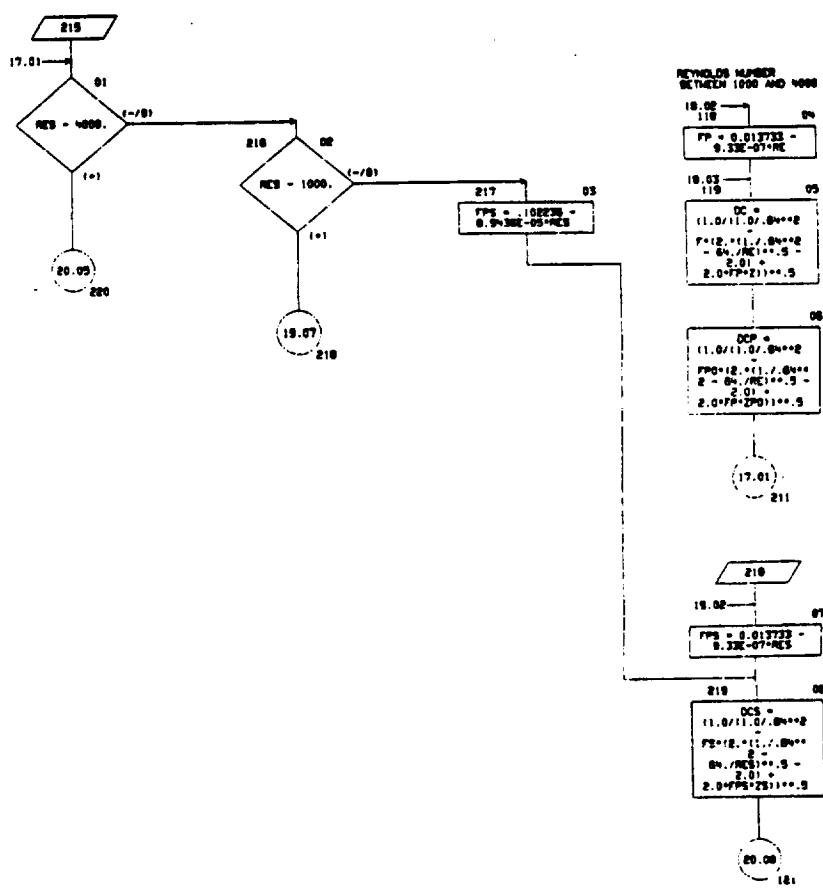


09/22/74

## AUX/FLOW CHART SET - FFD.FLO FFD-FLOW

PAGE 19

CHART TITLE - SUBROUTINE SHOCKST,ATM0,C,FAD,L,FRICP,FRICU

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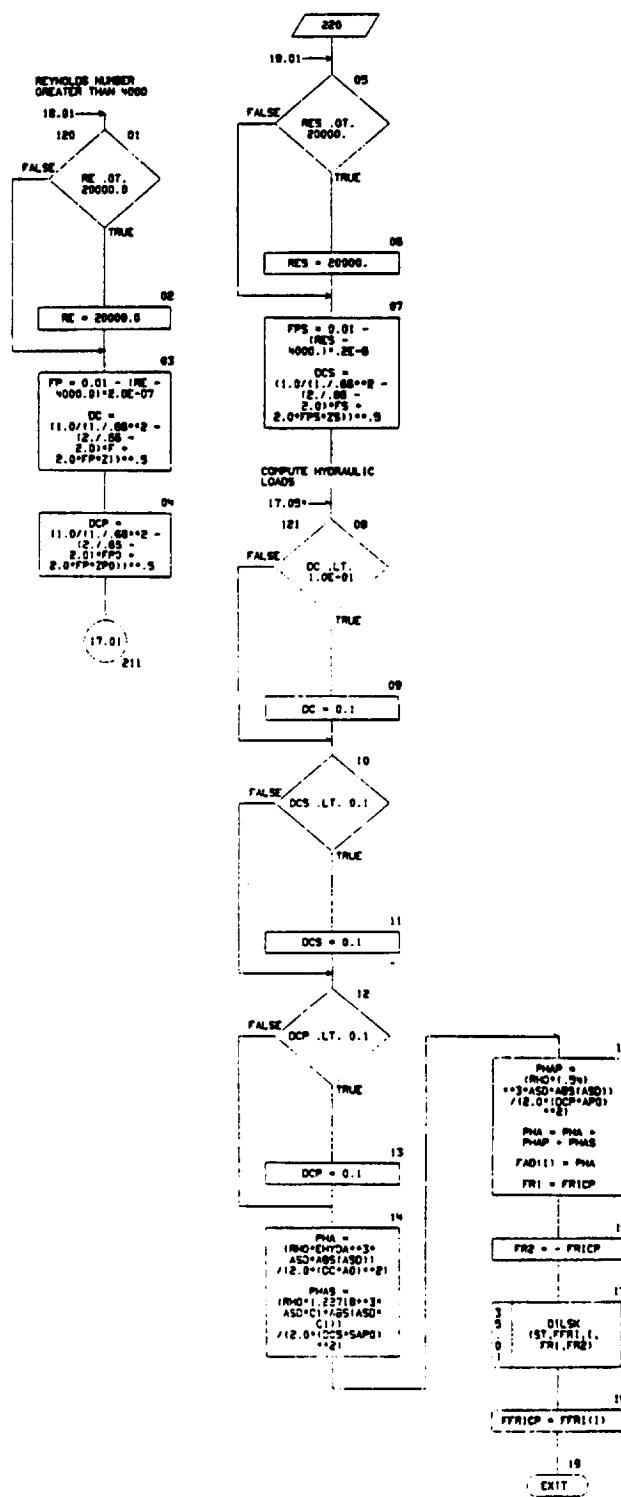
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05/22/79

AUTOMATION CHART SET - FFD0.FLO FFD0.FLM

PAGE 29

CHART TITLE - SUBROUTINE SHOCK1,ATMO,C,FAD,I,SYRCP,FRICP





## CHART TITLE - NON-PROCEDURAL STATEMENTS

```

DIMENSION STR(20), ATTR(20), C(150), FA(120), ST(20)
DIMENSION FS(10), S1(110)
      ,PF(1120)

COMPARISON(EQUVALENCE,DX(150),AD(211000))
EQUIVALENCE IS(150),ST(111),FS(10),S(175)
COMPARIS(12205)

DIMENSION CO(10),SS(10)
COMMON VAR(200)

EQUIVALENCE (CO(11),VAR(101)),SS(11),VAR(201))
COMMON /ADPL/, ALF(150)
DIMENSION AB(10),OD(10),SS2(10),CO(10)

EQUIVALENCE (ALF(01),AB(11)),(ALF(11),OD(11)),
(ALF(21),SS2(11)),(ALF(31),CO(11)),
(ALF(41),TS(50)),(ALF(42),JN(2))

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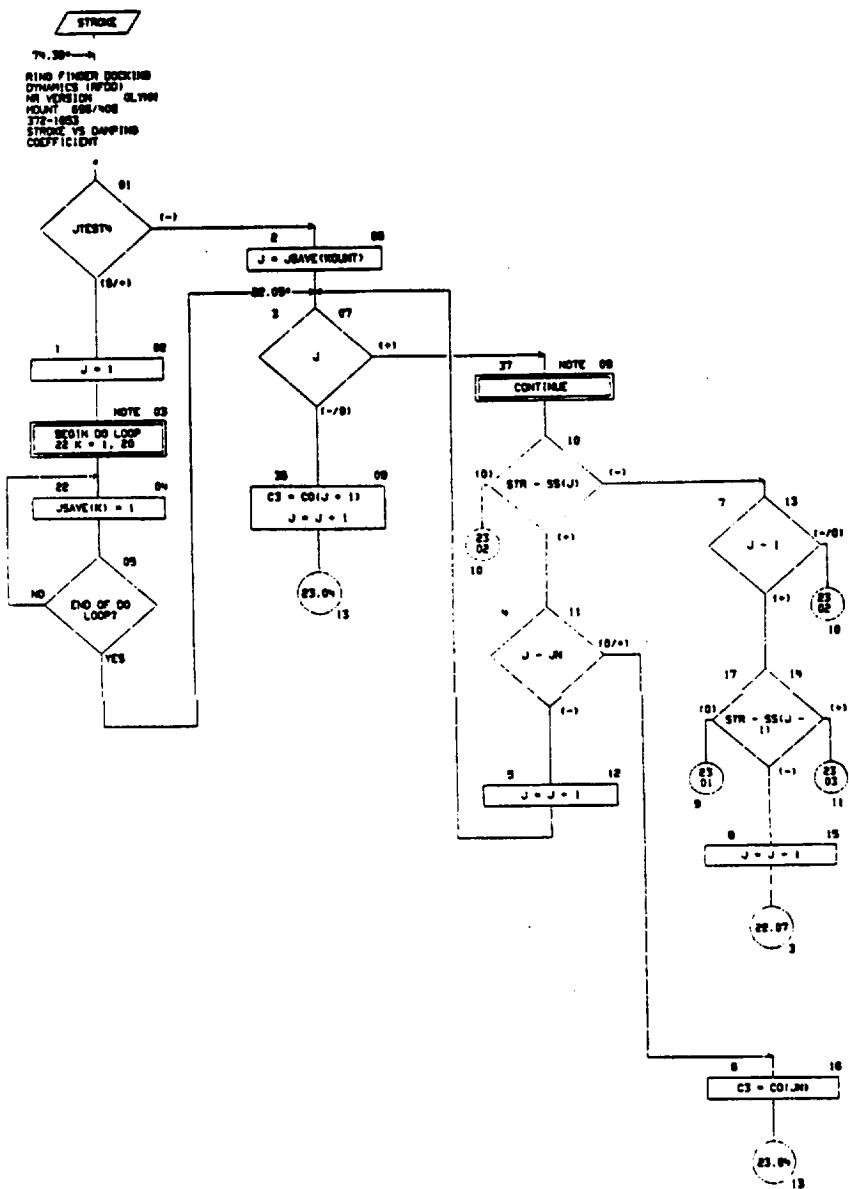
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05/26/79 AUTOFLOW CHART SET - RFDD.FLD RFDD-FLOW  
CHART TITLE - SUBROUTINE STRM(ROUTN,STR,1,C3,CO,SS,JTESTV,SH)

PAGE 20



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2





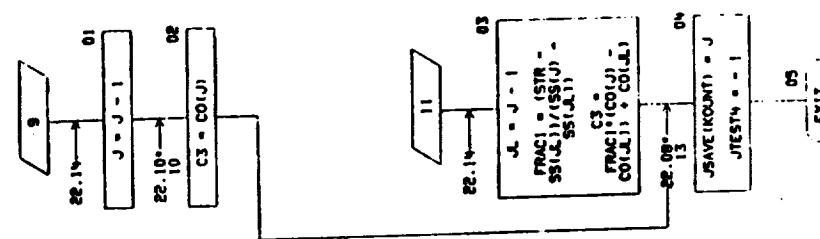


PAGE 23

MF7700, OA CHART SET - MF700, PLO MF700-FL04

CHART TITLE - SUBROUTINE STORE INDEX, STR, I, C3, CO, SS, JTEST1, JN1

05/22/74



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PAGE 24

A1 CHART SET - RF00.F10 RF00-F10A

05/22/79

CHART TITLE - NON-PROCEDURAL STATEMENTS

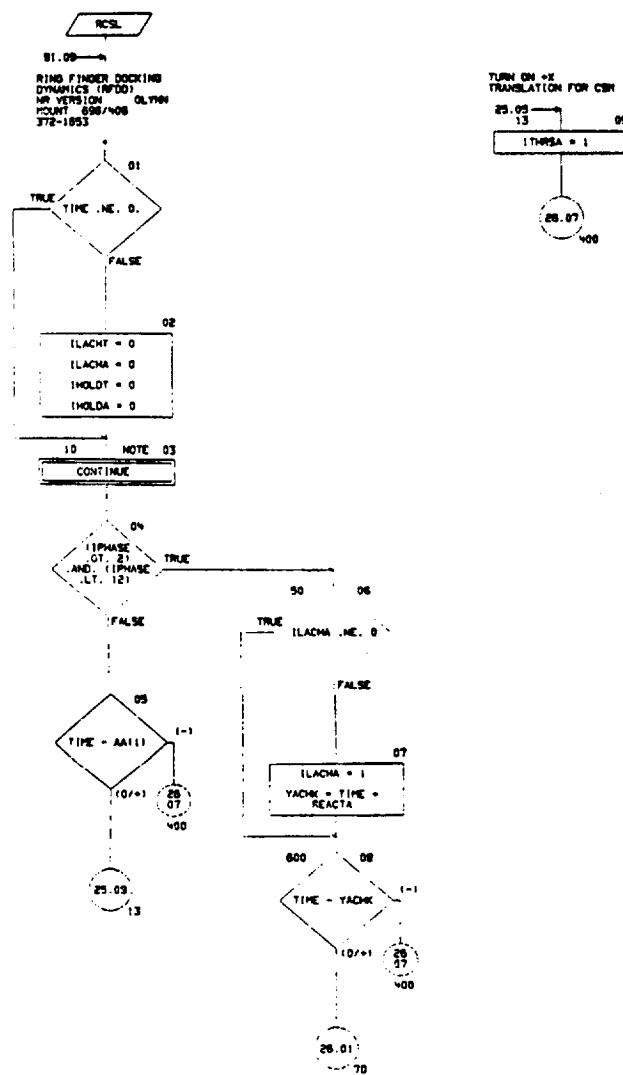
DIMENSION C(10), S(10)  
J34VE(10)

05/22/74

AUTY ON CHART SET - RFDD.FLD RFDD-FLDN

PAGE 23

CHART TITLE - SUBROUTINE RCSL





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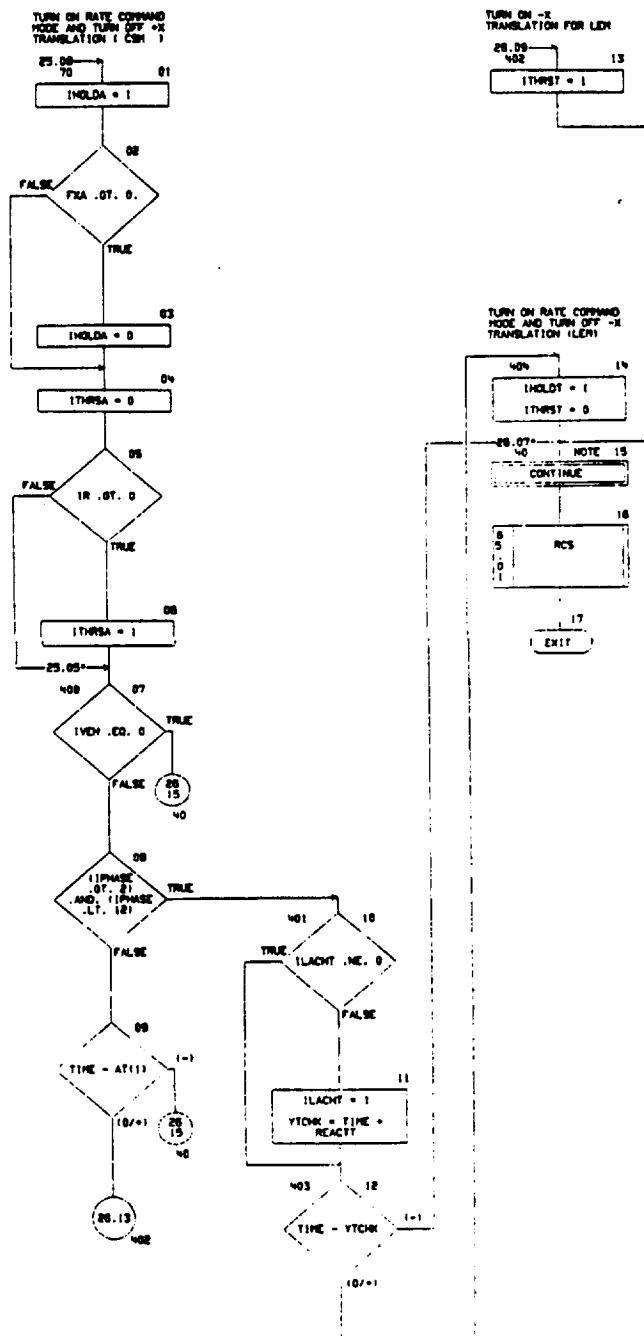
SD 74-CS-0023

05/22/79

AUT\*\* ON CHART SET - AF00.FLO AF00-FLOW

PAGE 28

CHART TITLE - SUBROUTINE RCS





REV D  
10/20/94

FOLDOUT SHEET

05/22/79

## AUTOPLOT CHART SET - RF00.FLG RF00-FL00

PAGE 27

CHART TITLE - NON-PROCEDURAL STATEMENTS

```

DIMENSION VAR(2400),T(8000),A(15),B(15),C(15),D(15),E(15),F(10),
     A(25),AT(30),CD(10),SB(10),YSAVE(270)
     S(2800),ADD(100)
EQUIVALENCE (T(1),XA1),(T(2),YA1),(T(3),ZA1),(T(4),XT1),(T(5),YT1),
     (T(6),ZT1),(T(7),ONEQXA),(T(8),ONEQYA),(T(9),ONEQZA),
     (T(10),ONEQXT),(T(11),ONEQYT),(T(12),ONEQZT),
     (T(13),THA),(T(14),PMA),(T(15),PSA),(T(16),THF),
     (T(17),PHF),(T(18),PSF),(T(19),PF),(T(20),YF),
     (T(21),ZP),(T(22),ZD),
     (T(23),XAD),(T(24),YAD),(T(25),ZAD),(T(26),XTD),
     (T(27),YTD),(T(28),ZTD)
EQUIVALENCE (A(8),XA1),(A(9),YA1),(A(10),ZA1),(A(15),ZZ1),
     (A(16),XY1),(A(7),Z21),(A(8),YZ1),(A(9),OF1),
     (A(10),OFF1),(A(11),PA1)
EQUIVALENCE (B(8),XT1),(B(9),XX1),(B(10),YY1),(B(15),ZZ1),
     (B(16),XY1),(B(17),XZ1),(B(18),YZ1),(B(19),OFF1),
     (B(20),OFFXT)
EQUIVALENCE (C(2),IPHASE),(C(3),STOP),(C(4),IPLOT),(C(5),ITABLE),
     (C(6),IPRINT),(C(7),DELP),(C(8),DESC),(C(9),JU),
     (C(10),ICASE)
EQUIVALENCE (F(2),THEM),(F(3),NI),(F(4),AS1),(F(5),AB),(F(6),KA1),
     (F(7),AB),(F(8),AN),(F(9),AT)
EQUIVALENCE (AA(12),THOMA),(AA(13),PHOMA),(AA(14),PSOMA),
     (AA(15),AROMA),(AA(16),ARYA),(AA(17),ARZA),(AA(18),ADPHM),
     (AA(19),ADM),(AA(20),ADPSA),(AA(21),TRAT),(AA(22),TYA),
     (AA(23),TZA),(AA(24),OBANKA),(AA(25),OBANYA),
     (AA(26),OBANKA),(AA(27),FXA1),(AA(28),REACTA),
     (AA(29),BANKA),(AA(30),BANYA),(AA(31),BANKA),
     (AA(32),IRI)
EQUIVALENCE (AT(2),OROM),(AT(3),DWX1),(AT(4),TRECST),(AT(5),OPX),
     (AT(6),APXT1),(AT(7),ARYT1),(AT(8),ARZT1),(AT(9),ADPT1),
     (AT(10),ADVT1),(AT(11),ADPS1),(AT(12),OBANT1),
     (AT(13),OBANT1),(AT(14),OBANT1),(AT(15),THCONT),
     (AT(16),PHCONT),(AT(17),PSCONT),(AT(18),REACT1),
     (AT(19),BANK1),(AT(20),BANY1),(AT(21),BANK1),
     (AT(22),TXY1),(AT(23),TY1),(AT(24),TZ1),(AT(25),FTX1),
     (AT(26),RNXT1),(AT(27),YNXT1),(AT(28),PNXT1),
     (AT(29),RC1),(AT(30),LVEH)
,(S(31),THPSA),(S(32),THPS1),(S(33),INOLDA),(S(34),INOLD),
EQUIVALENCE (VAR(1),A11),(VAR(18),B11),(VAR(31),C11),
     (VAR(19),D11),(VAR(111),E11),(VAR(128),F11),
     (VAR(136),AA11),(VAR(181),AT11),(VAR(191),CD11),
     (VAR(201),BS11),(VAR(211),T11)
COMMON VAR
COMMON/REFL/TIME,DX(100),ADD5(1000)
COMMON/PP/MP,LL
COMMON/INITIAL/ARN1,TIMEP,PULL,JTESTV,SLOPE
,PROBEA,TL8A,11,IAK1,THEISH,CONST
COMMON/L00/YARM1,YARM2,YARM3,XLCB1,XLCB2,XLCB3
COMMON/TRANS/ DAME11,DAME12,DAME13,DAME1,DAME2,DAME3,
     DAME32,DAME33,DAME11,DAME12,DAME13,DAME21,DAME22,DAME23,DAME31,
     DAME32,DAME33,DAME11,DAME12,DAME13,DAME21,DAME22,DAME23,DAME31,
     DAME32,DAME33,DAME11,DAME12,DAME13,DAME21,DAME22,DAME23,DAME31,
     DAME32,DAME33,DAME11,DAME12,DAME13,DAME21,DAME22,DAME23,DAME31,
     DAME32,DAME33,DAME11,DAME12,DAME13,DAME21,DAME22,DAME23,DAME31,
     DAME32,DAME33,DAME11,DAME12,DAME13,DAME21,DAME22,DAME23,DAME31
COMMON/CALCU/F0,FC,F1,T0,T1,FS1,FS2,FS3,FC1,FC2,FC3,ETA1,
     ETA2,ETA3,FRT1A,FRT2A,FRT3A,TL51,TL52,TL53,FRT1B,FRT2B,FRT3B,
     VELB1,VELB2,VELB3,VLCP,FRCP,FRC1,FRC2,FRC3,PROBL
COMMON/CAS/ CASE
COMMON/DRODU/ETA,YOC,ZOC

```







PAGE 29

AUTM-10 CHART SET - RTDD-FLO RTDD-FLOW

09/22/74

CHART TITLE - NON-PROCEDURAL STATEMENTS

COPRIV/MECAL/S  
COPRIV/REV/RDT  
COPRIV/ADDENDA/ADD

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- 189 -

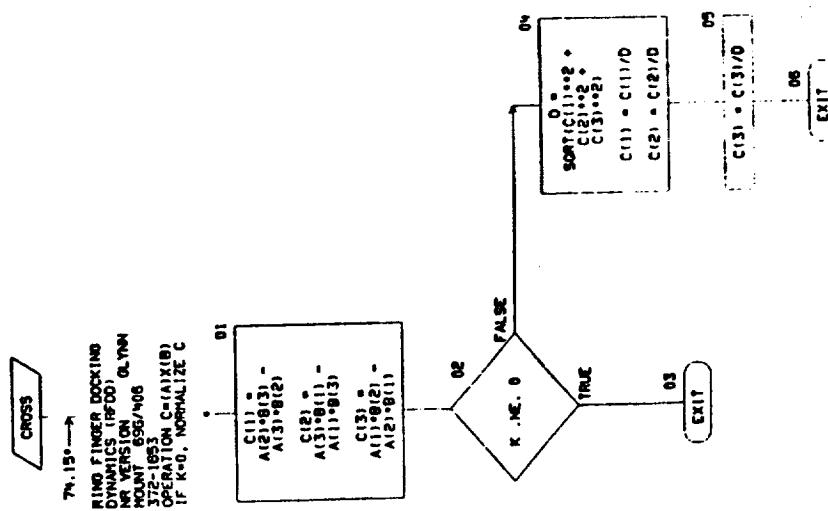
SD 74-CS-0023



PAGE 29

AUTP-10 CHART SET - RPT00.FLO RPT00-FLOW

09/22/74  
CHART TITLE - SUBROUTINE CROSS(A,B,C,K)





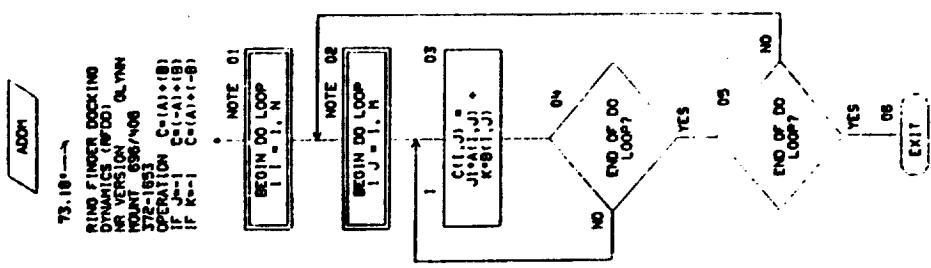
PAGE 39

AU - CHART SET - RPD0.RPL0 INFO-FN

09/22/79  
CHART TITLE - NON-PROCEDURAL STATEMENTS

DIMENSION A(31,B(31,C(31)

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PAGE 32

AUTOMATION CHART SET - MFD0, FL0 MFD0-FLOW

05/22/74  
CHART TITLE - NON-PROCEDURAL STATEMENTS

DIMENSION A(MD.11.B(MD.11.C(MD.11

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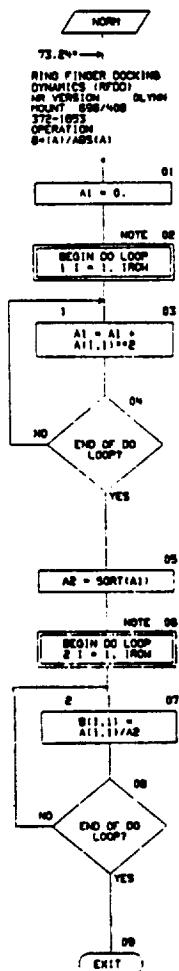
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08/22/74

**AUTOTRON CHART SET - 8700.FLO 8700-FLOW**

PAGE 2

**CHART TITLE - SUBROUTINE NORMA.B.IRM.1D**



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PAGE

AUT-101-01 CHART SET - MFD01.FLO MFD02-FLOW

05/22/79

CHART TITLE • NON-PROCEDURAL STATEMENTS

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DIMENSION A1D.11.B1D.11

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SD 74-C3-0023



ROUTINE NAME 1

C-3

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- 199 -

SD 74-CS-0223

ROUTINE NAME 2

05/02/74

CHART TITLE - SUBROUTINE OILSK(STR,FAD,I,FMAX,FMIN)

AUTOMATION CHART SET - RFDD.FLO RFDD-FLOW

PAGE 38

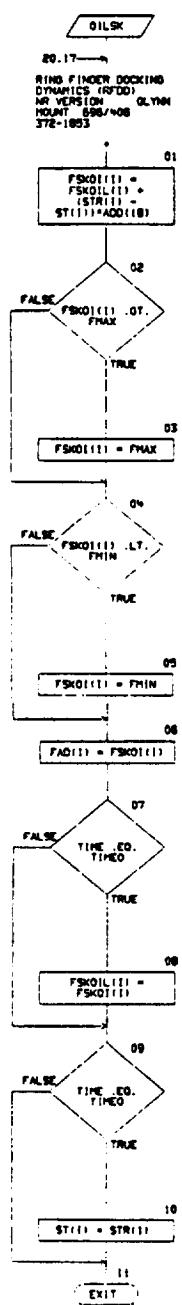




CHART TITLE - NON-PROCEDURAL STATEMENTS

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DIMENSION STATE(S), FSTOL(10), ST(10), FAD(20), FBD(110)  
EQUIVALENCE (S100), ST(111), ST(75), FSTOL(111)  
COPRIV/RECALL(S12289)  
COMMON/FILE/TYPE, DX(150), ADD5(1000)  
COMMON/TYPE/FILE  
COPRIV/ADDENV/ADD1(00)



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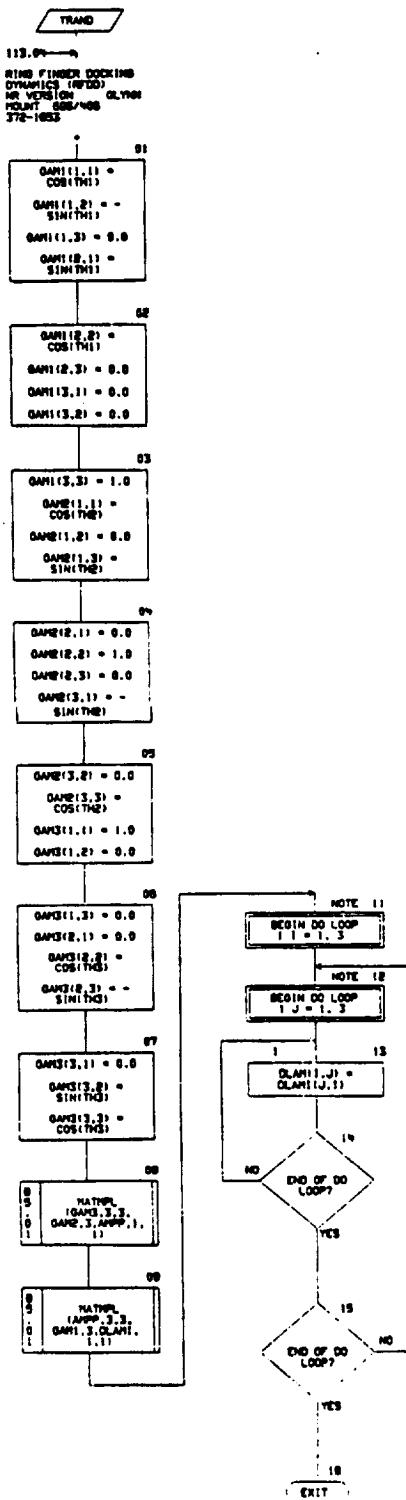


03/22/78

AUTOPLOT CHART SET - AF00.FLG AF00-FL0M

PAGE 37

CHART TITLE - SUBROUTINE TRANSDTH1,THE,THE,DLAT,DLAT1



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05/22/74

CHART TITLE - NON-PROCEDURAL STATEMENTS

AUTOMATION CHART SET - RP00.R10 RP00-R10

PAGE 38

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SD 74-CS-0023



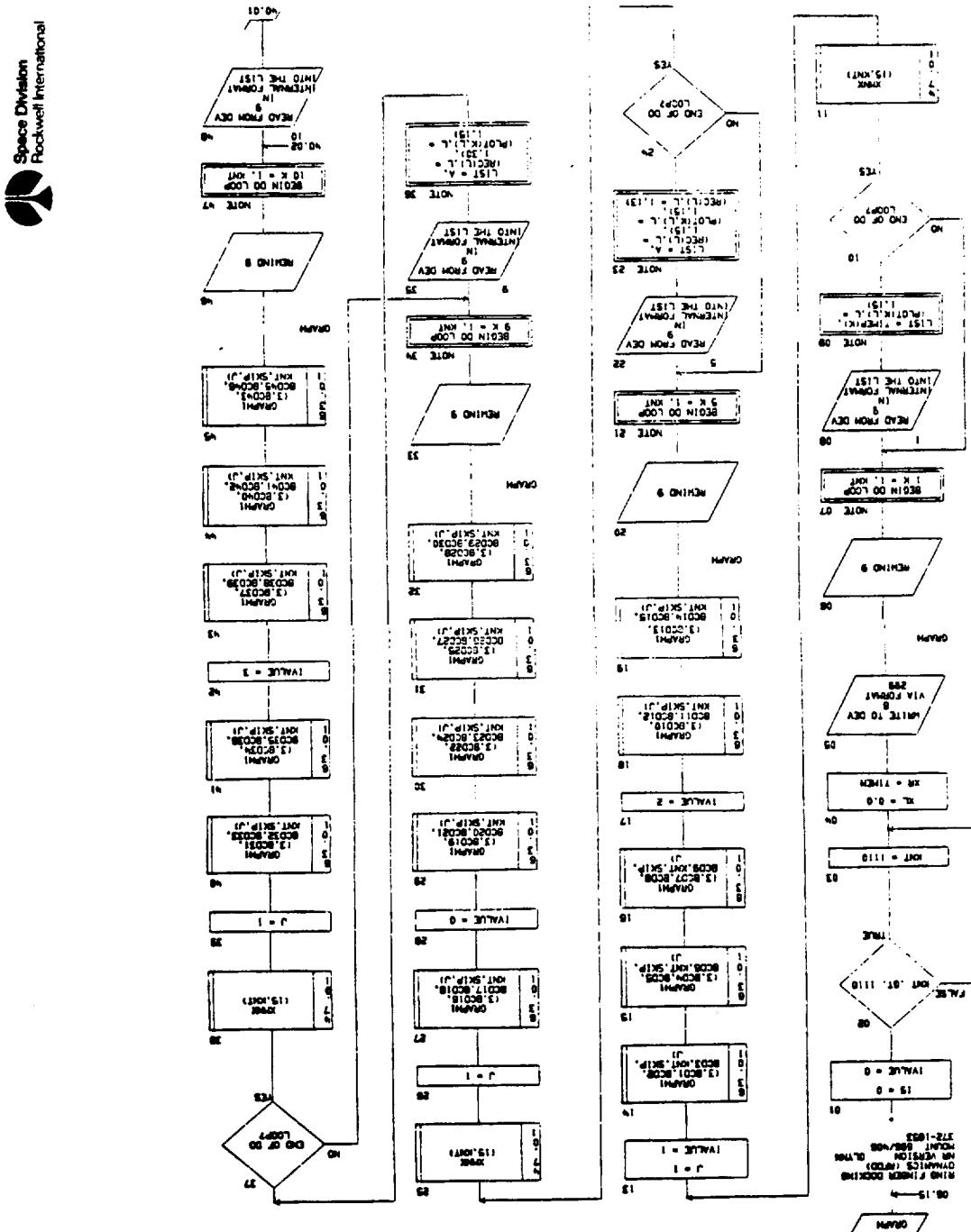
DIMENSION DMM(13,3),DME(13,3),DAM(13,3),APP(13,3),CLM(13,3).  
CLM(13,3)

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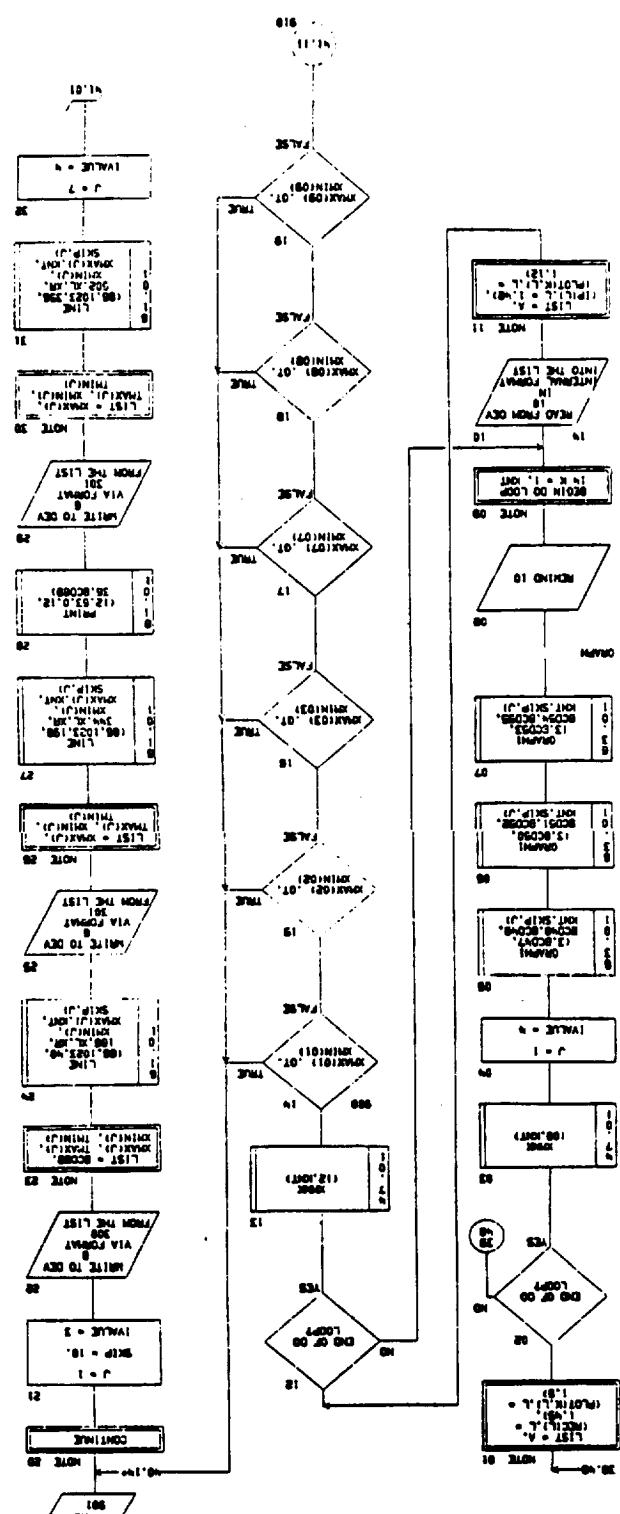
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Space Division



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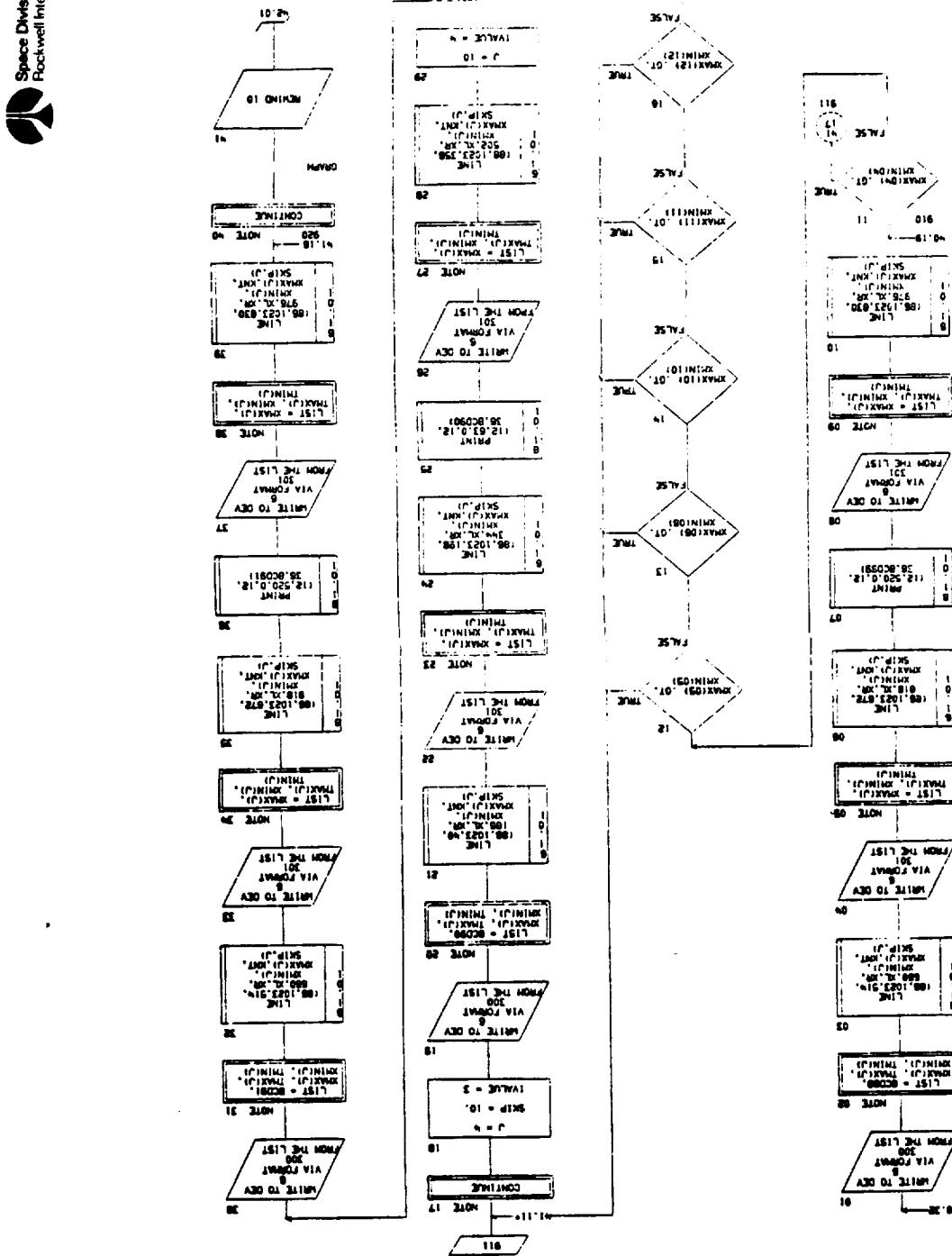
- 209 -

11





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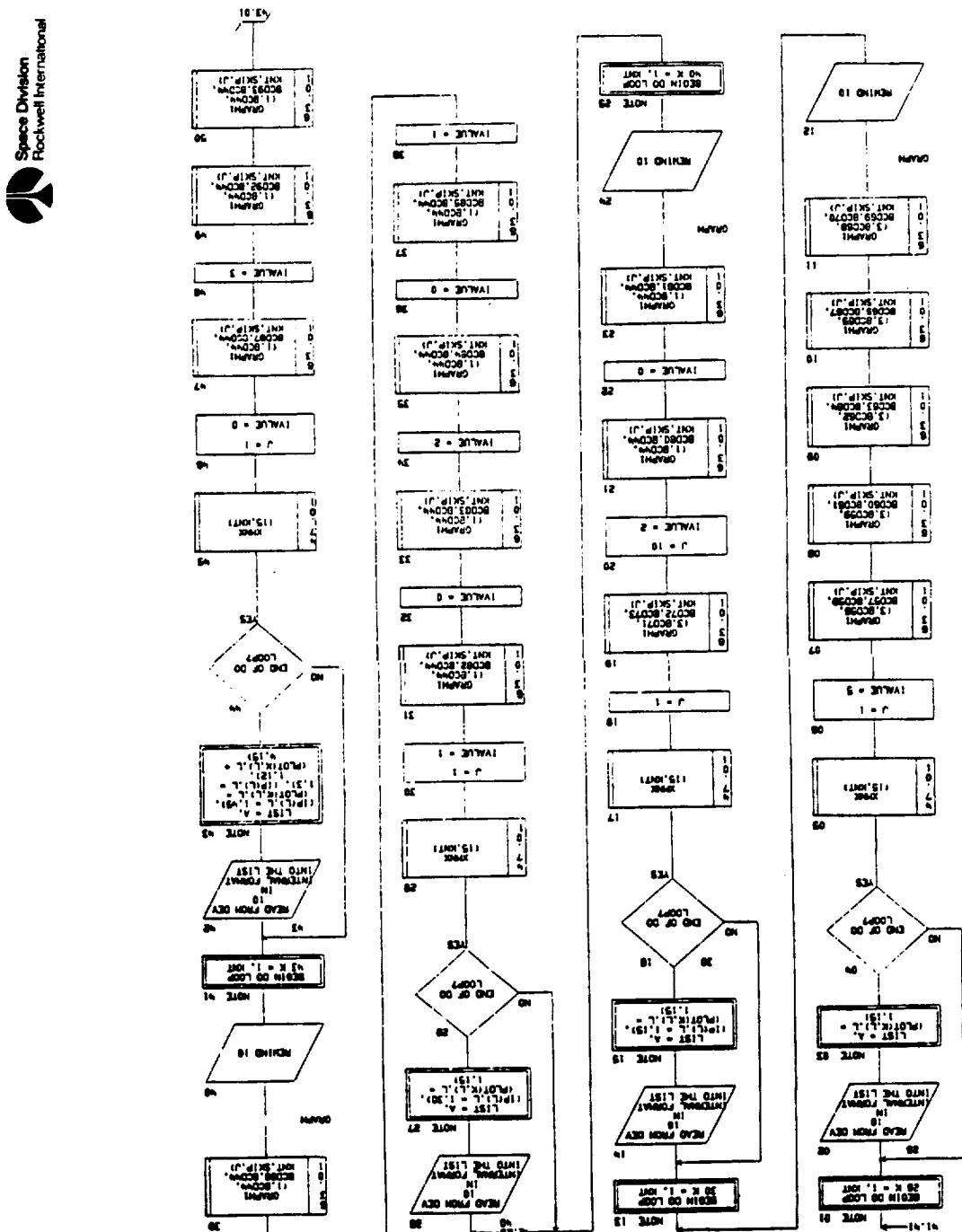
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23

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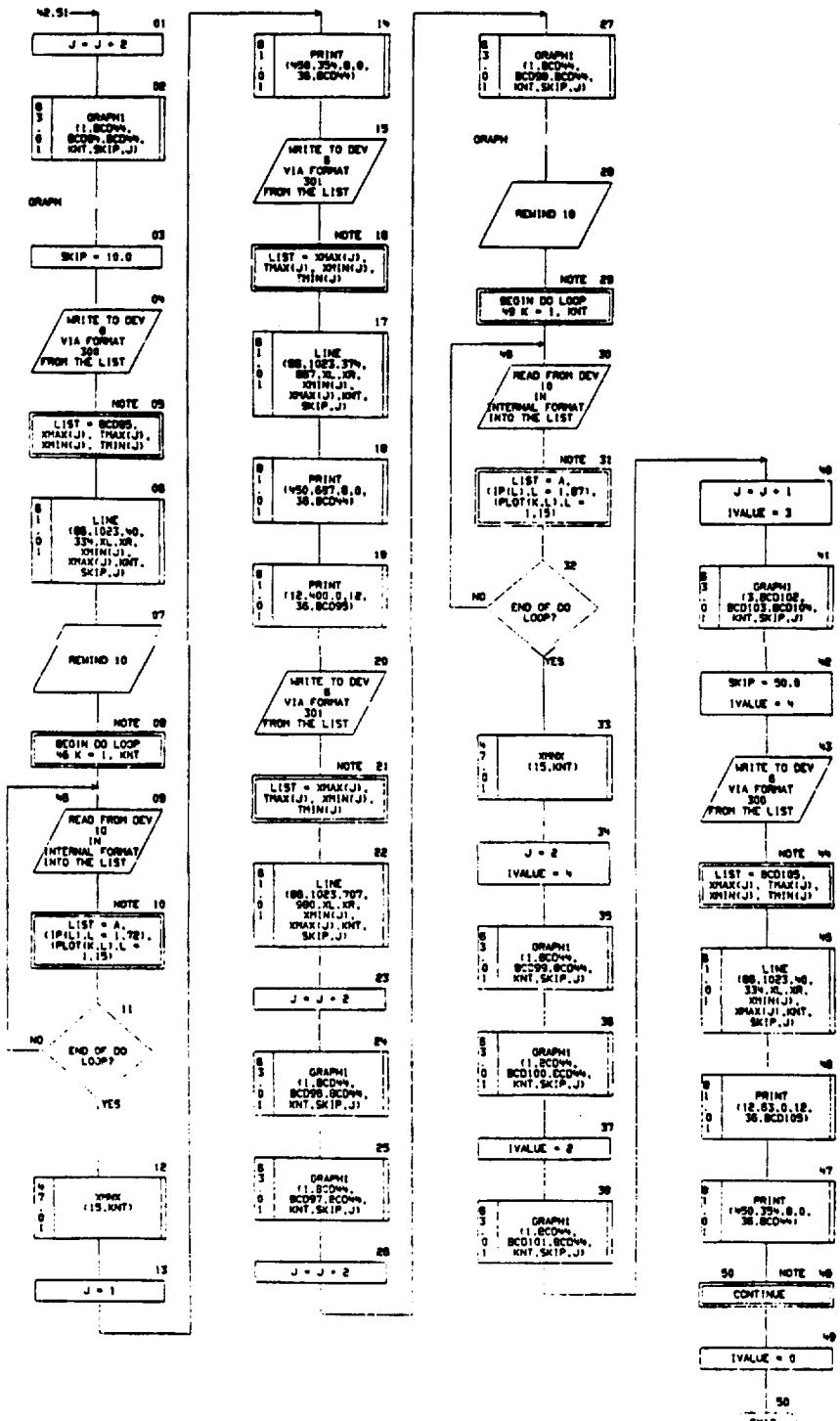


05/26/76

AUTOPLOT CHART SET - #P00.FLO #P00-FLOW

PAGE 43

CHART TITLE - SUBROUTINE GRAPHINT,TINER,TINERD

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05/22/74

AUT\*\* ON CHART SET - AFDD.FLO AFDD-FLOW

PAGE 4

CHART TITLE - NON-PROCEDURAL STATEMENTS

DIMENSION PL(7)(110),IP(110),TP(110)  
DIMENSION SC01(9),SC02(9),SC03(9),SC04(9),SC05(9),SC06(9),SC07(9),  
SC08(9),SC09(9),SC10(9),SC11(9),SC12(9),SC13(9),SC14(9),SC15  
101,SC016(9),SC017(9),SC018(9),SC019(9),SC020(9),SC021(9),SC022(9),  
1,SC023(9),SC024(9),SC025(9),SC026(9),SC027(9),SC028(9),SC029(9),  
SC030(9),SC031(9),SC032(9),SC033(9),SC034(9),SC035(9),SC036(9),  
SC037(9),SC038(9),SC039(9),SC040(9),SC041(9),SC042(9),SC043(9),  
SC044(9),SC045(9),SC046(9),  
.SC047(9),SC048(9),SC049(9),SC050(9),SC051(9),SC052(9),  
.SC053(9),SC054(9),SC055(9),SC056(9),SC057(9),SC058(9),  
.SC059(9),SC060(9),SC061(9),SC062(9),SC063(9),SC064(9),SC065(9)  
DIMENSION  
SC066(9),SC067(9),SC068(9),SC069(9),SC070(9),SC071(9),SC072(9),  
.SC073(9),SC074(9),SC075(9),SC076(9),SC077(9),SC078(9),SC079(9),  
.SC080(9),SC081(9),SC082(9),SC083(9),SC084(9),SC085(9),SC086(9),  
.SC087(9),SC088(9),SC089(9),SC090(9),SC091(9),SC092(9),SC093(9),  
.SC094(9),SC095(9),SC096(9),SC097(9),SC098(9),SC099(9),SC0100(9),  
.SC0101(9),SC0102(9),SC0103(9),SC0104(9),SC0105(9)  
COMMON/GRAPH/PLOT,TMPD,IP,15  
DIMENSION REC(43),XMAX(43),XMIN(43),YMAX(15),YMIN(15)  
COMMON /GRAPH/ X1,XR,XMIN,XMAX,THIN,THICK  
COMMON /CDB/ IVALUE  
DATA SC01/38H XAD FT/SEC /  
DATA SC02/38H YAD FT/SEC /  
DATA SC03/38H ZAD FT/SEC /  
DATA SC04/38H XTD FT/SEC /  
DATA SC05/38H YTD FT/SEC /  
DATA SC06/38H ZTD FT/SEC /  
DATA SC07/38H XRD FT/SEC /  
DATA SC08/38H YRD FT/SEC /  
DATA SC09/38H ZRD FT/SEC /  
DATA SC010/38H XA FT /  
DATA SC011/38H YA FT /  
DATA SC012/38H ZA FT /  
DATA SC013/38H XT FT /  
DATA SC014/38H YT FT /  
DATA SC015/38H ZT FT /  
DATA SC016/38H XR FT /  
DATA SC017/38H YR FT /  
DATA SC018/38H ZR FT /  
DATA SC019/38H QHEDA DEG/SEC /  
DATA SC020/38H QHEDA DEG/SEC /  
DATA SC021/38H QHEDA DEG/SEC /  
DATA SC022/38H QHEDB DEG/SEC /  
DATA SC023/38H QHEDY DEG/SEC /  
DATA SC024/38H QHEDZ DEG/SEC /  
DATA SC025/38H QHEDR DEG/SEC /  
DATA SC026/38H QHEDV DEG/SEC /  
DATA SC027/38H QHEDW DEG/SEC /  
DATA SC028/38H QHEDX DEG/SEC /  
DATA SC029/38H PMA DEG /  
DATA SC030/38H TMA DEG /  
DATA SC031/38H PHT DEG /  
DATA SC032/38H THT DEG /  
DATA SC033/38H PST DEG /  
DATA SC034/38H PHR DEG /  
DATA SC035/38H THR DEG /  
DATA SC036/38H PSR DEG /  
DATA SC037/38H FSUMLX LBS /  
DATA SC038/38H FSUMLY LBS /  
DATA SC039/38H FSUMLZ LBS /  
DATA SC040/38H FSUMLX LBS /  
DATA SC041/38H FSUMLY LBS /

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09/28/79

AUT. LON CHART SET - AFDD-FLO AFDD-FLOW

PAGE 48

CHART TITLE - NON-PROCEDURAL STATEMENTS

```
DATA BC006/30H PSLNTZ LBS /  
DATA BC003/30H PSLPRZ LBS /  
DATA BC004 / MH TIR,WE - ,WHECO,WH005 ,2PIN /  
DATA BC005/30H PSLPRY LBS /  
DATA BC006/30H PSLPRZ LBS /  
DATA BC007/30H TSUPLX FT LBS /  
DATA BC008/30H TSUPLY FT LBS /  
DATA BC009/30H TSUPLX FT LBS /  
DATA BC010/30H TSUPLY FT LBS /  
DATA BC011/30H TSUPLX FT LBS /  
DATA BC012/30H TSUPLY FT LBS /  
DATA BC013/30H TSUPLX FT LBS /  
DATA BC014/30H TSUPLY FT LBS /  
DATA BC015/30H TSUPLX FT LBS /  
DATA BC016/30H TSUPLY FT LBS /  
DATA BC017/30H FORCE ATTEN 1 LBS /  
DATA BC018/30H STROKE ATTEN 1 FT /  
DATA BC019/30H VELOCITY ATTEN 1 FT/SEC /  
DATA BC020/30H FORCE ATTEN 2 LBS /  
DATA BC021/30H STROKE ATTEN 2 FT /  
DATA BC022/30H VELOCITY ATTEN 2 FT/SEC /  
DATA BC023/30H FORCE ATTEN 3 LBS /  
DATA BC024/30H STROKE ATTEN 3 FT /  
DATA BC025/30H VELOCITY ATTEN 3 FT/SEC /  
DATA BC026/30H FORCE ATTEN 4 LBS /  
DATA BC027/30H STROKE ATTEN 4 FT /  
DATA BC028/30H VELOCITY ATTEN 4 FT/SEC /  
DATA BC029/30H FORCE ATTEN 5 LBS /  
DATA BC030/30H STROKE ATTEN 5 FT /  
DATA BC031/30H VELOCITY ATTEN 5 FT/SEC /  
DATA BC032/30H FORCE ATTEN 6 LBS /  
DATA BC033/30H STROKE ATTEN 6 FT /  
DATA BC034 / 9*1H /  
DATA BC035 / 9*1H /  
DATA BC036 / 9*1H /  
DATA BC037 / 9*1H /  
DATA BC038 / 9*1H /  
DATA BC039 / 9*1H /  
DATA BC040 / 9*1H /  
DATA BC041/30H RMTA X Y Z FT /  
DATA BC042/30H RMTA X Y Z DEG /  
DATA BC043/30H RMTA X Y Z FT/SEC /  
DATA BC044/30H RMTA X Y Z DEG/SEC /  
DATA BC045/30H RMTT X Y Z FT /  
DATA BC046/30H RMTT X Y Z DEG /  
DATA BC047/30H RMTT X Y Z FT/SEC /  
DATA BC048/30H RMTT X Y Z DEG/SEC /  
DATA BC049/30H RCS FORCE X Y Z ACTIVE VEHICLE /  
DATA BC050/30H RCS TORQUE X Y Z ACTIVE VEHICLE /  
DATA BC051/30H RCS FORCES X Y Z TARGET VEHICLE /  
DATA BC052/30H RCS TORQUE X Y Z TARGET VEHICLE /  
DATA BC053 / MH FOR,WE B,WHEWE,WH01 F,WHNGE,WH01,  
WH03 ,2PIN /  
DATA BC054 / MH FOR,WE B,WHEWE,WH01 F,WHNGE,WH01,  
WH08 ,2PIN /  
DATA BC055 / MH FOR,WE - ,WH TA,WH005,WH FIN,WH005,  
WH010,WH 1-3,WH /  
DATA BC056 / MH FOR,WE - ,WH TA,WH005,WH FIN,WH005,  
WH010,WH 4-8,WH /  
DATA BC057 / MH FOR,WE - ,WH RI,WH005 F,WHNGE,WH RI,  
WH005,WH 1-3,WH /  
DATA BC058 / MH FOR,WE - ,WH RI,WH005 F,WHNGE,WH RI,  
WH005,WH 4-8,WH /  
DATA BC059 / MH LAT,WH01 L,WH005,WH 1-3,WH L,WH005 ,3*1H /
```





## CHART TITLE - NON-PROCEDURAL STATEMENTS

```

DATA BC0109/3BH ACTIVE INTERFACE TORQUES, FT LBS
DATA BC0109/3BH TARGET INTERFACE TORQUES, FT LBS
DATA BC0109/3BH TARGET FINGER INTERFERENCE DISTANCE
DATA BC0109 / 'NH FCA,WHB1 ,NH LBS,8°IH '
DATA BC0109 / 'NH FCA,WHB1 ,NH LBS,8°IH '
DATA BC0109 / 'NH FCA,WHB2 ,NH LBS,6°IH '
DATA BC0109 / 'NH FCA,WHB3 ,NH LBS,8°IH '
DATA BC0109 / 'NH TDO,WHTR ,NH FT ,NH LBS ,9°IH '
FORMATIN(2X,'VARIABLE',3SX,'MAXIMUM VALUE',3SX,'AT TIME')
SK,'MINIMUM VALUE',3SX,'AT TIME')
200 FORMATIN(2X,SAN,21NX,E14.7,2X,E14.7)
201 FORMATIN 2X,38X,21NX,E14.7,2X,E14.7)
```

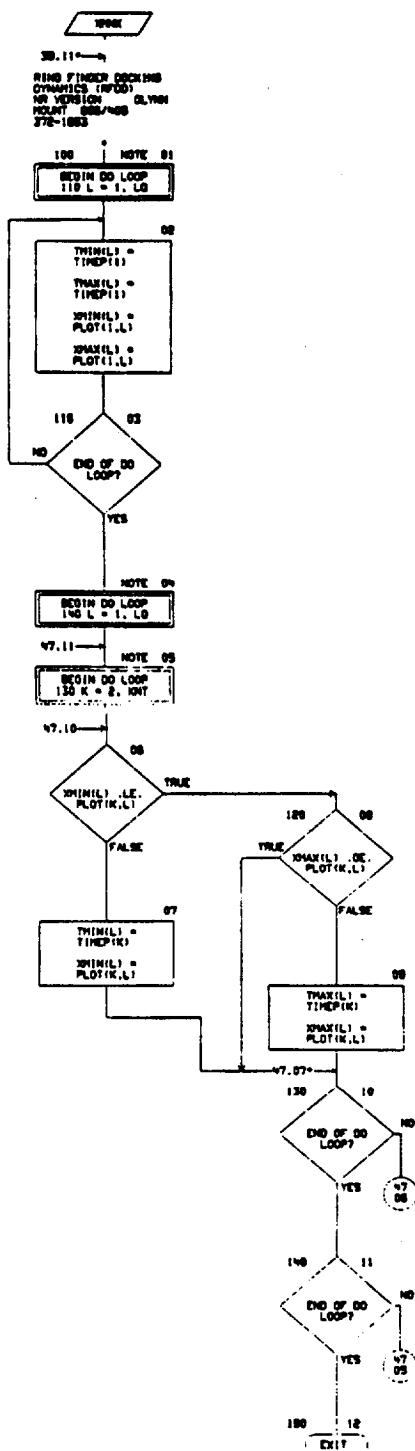
- 221 -

SD 74-CS-0Q23

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CHART TITLE - SUBROUTINE XMINIL,INT

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```
DIMENSION PLOT(1110,15),TIMEP(1110),IP(1110)
COPON /GRAPH/ PLOT,TIMEP,IP,15
DIMENSION REC(153),XRMIN(153),XRMAX(153),TRMIN(153),
COPON /GRAPH/ SL,XR,XMIN,XMAX,TRMIN,TRMAX
```

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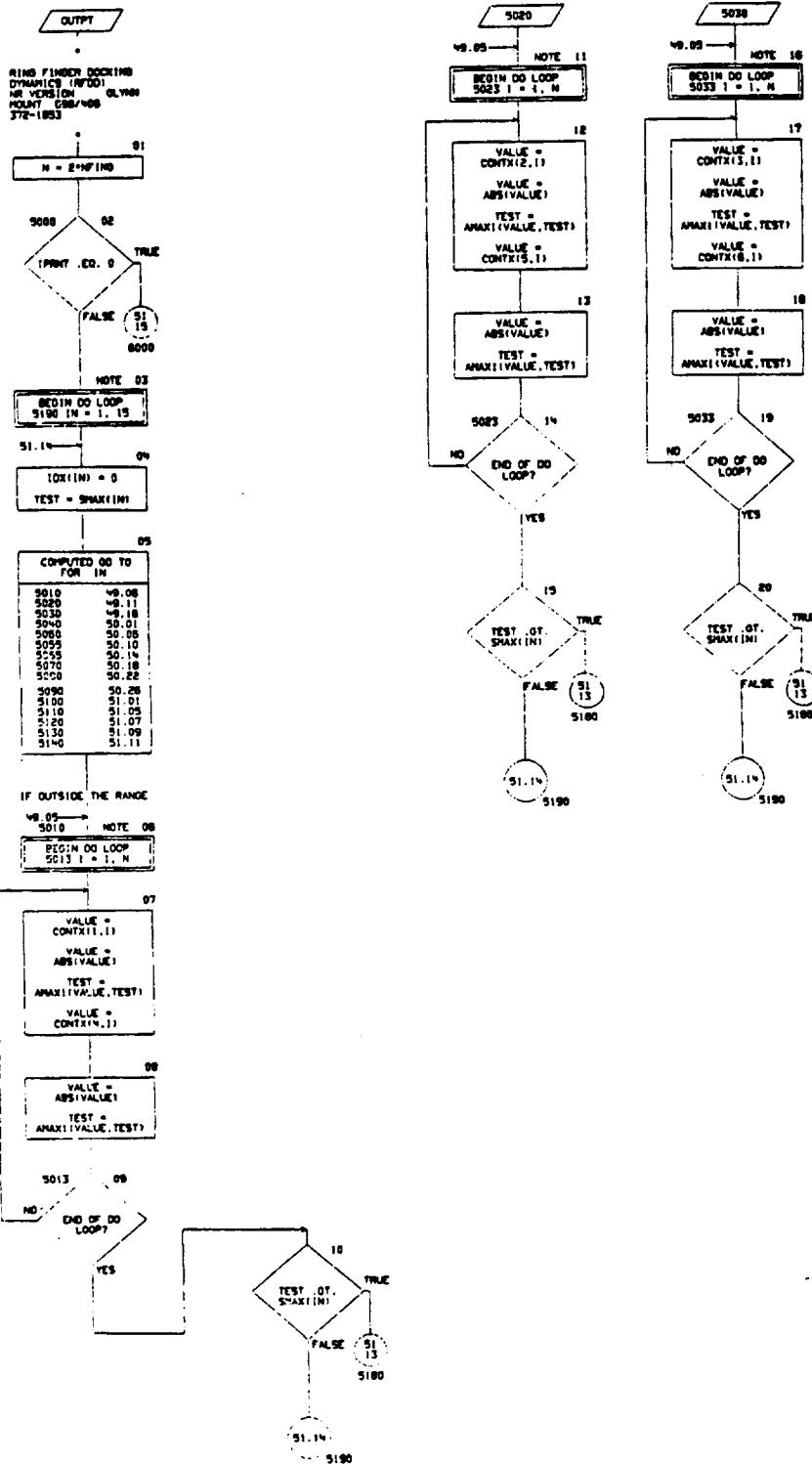
SD 74-CS-0023

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四/五/六

AUTOM. CHART SET - RF00.FLO RF00-FLO

PAGE 4



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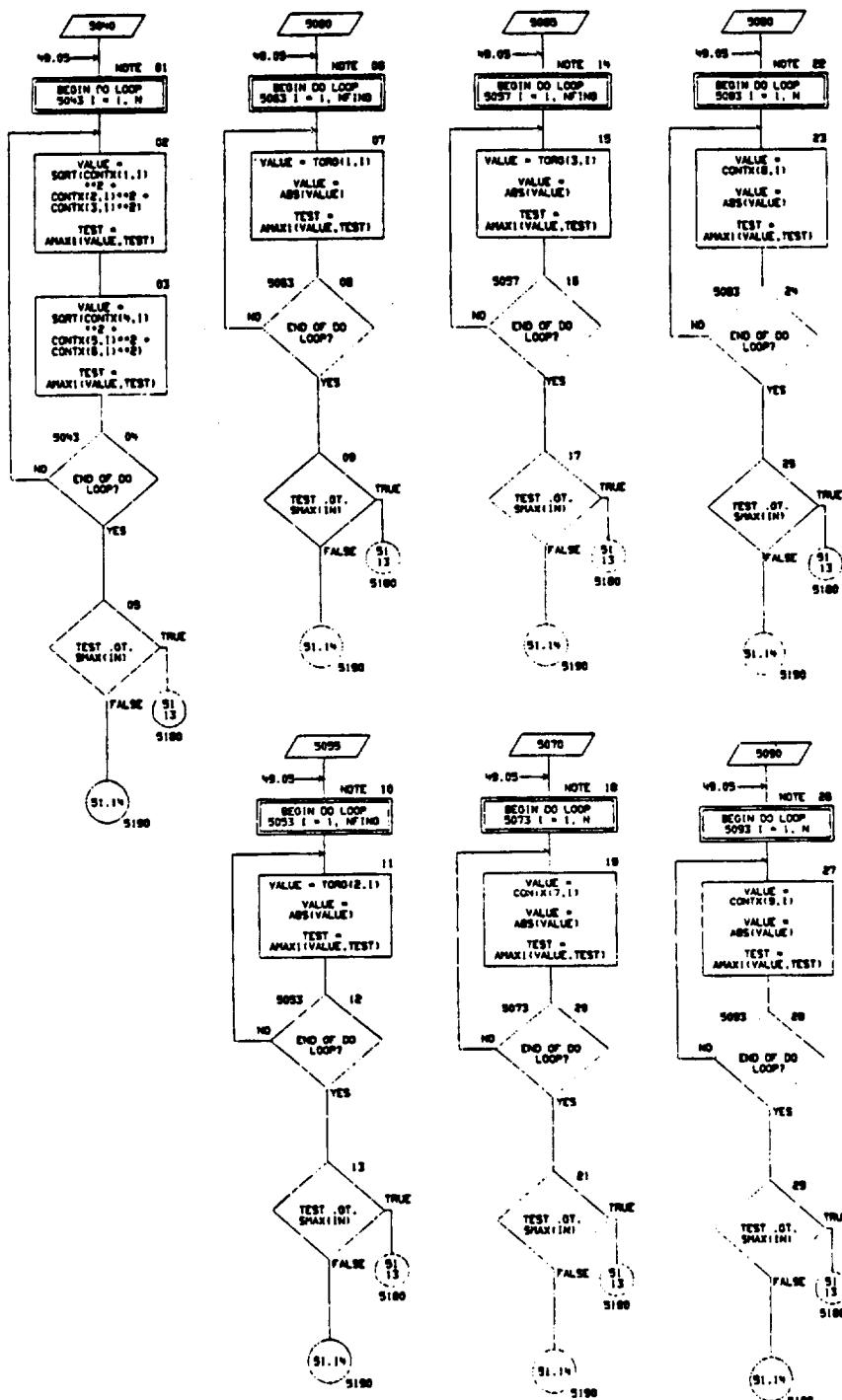


09/22/76

AUTOMATION CHART SET - RFDD.FLO RFDD-FLOW

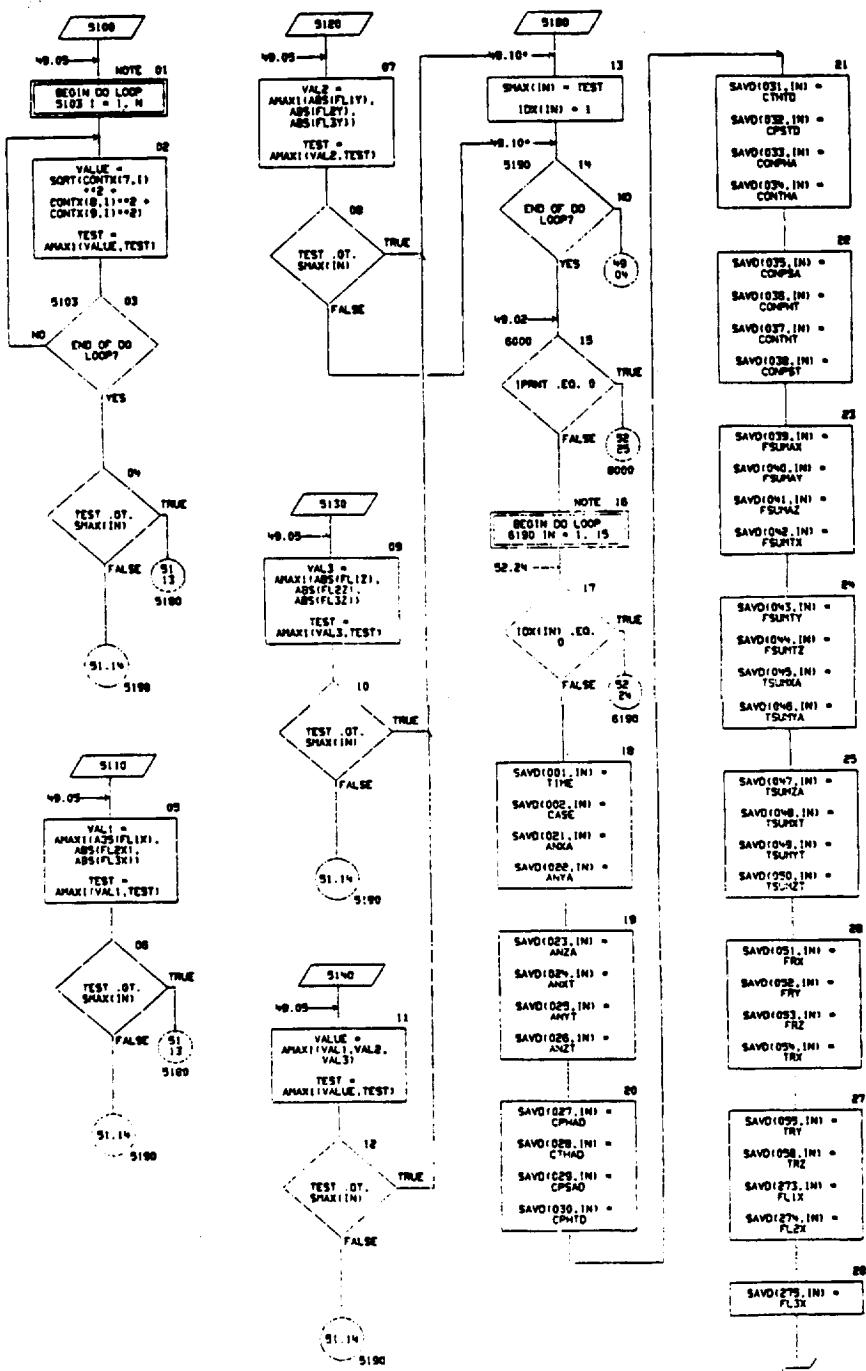
PAGE 56

CHART TITLE - SUBROUTINE OUTPUT





**CHART TITLE - SUBROUTINE OUTPUT**



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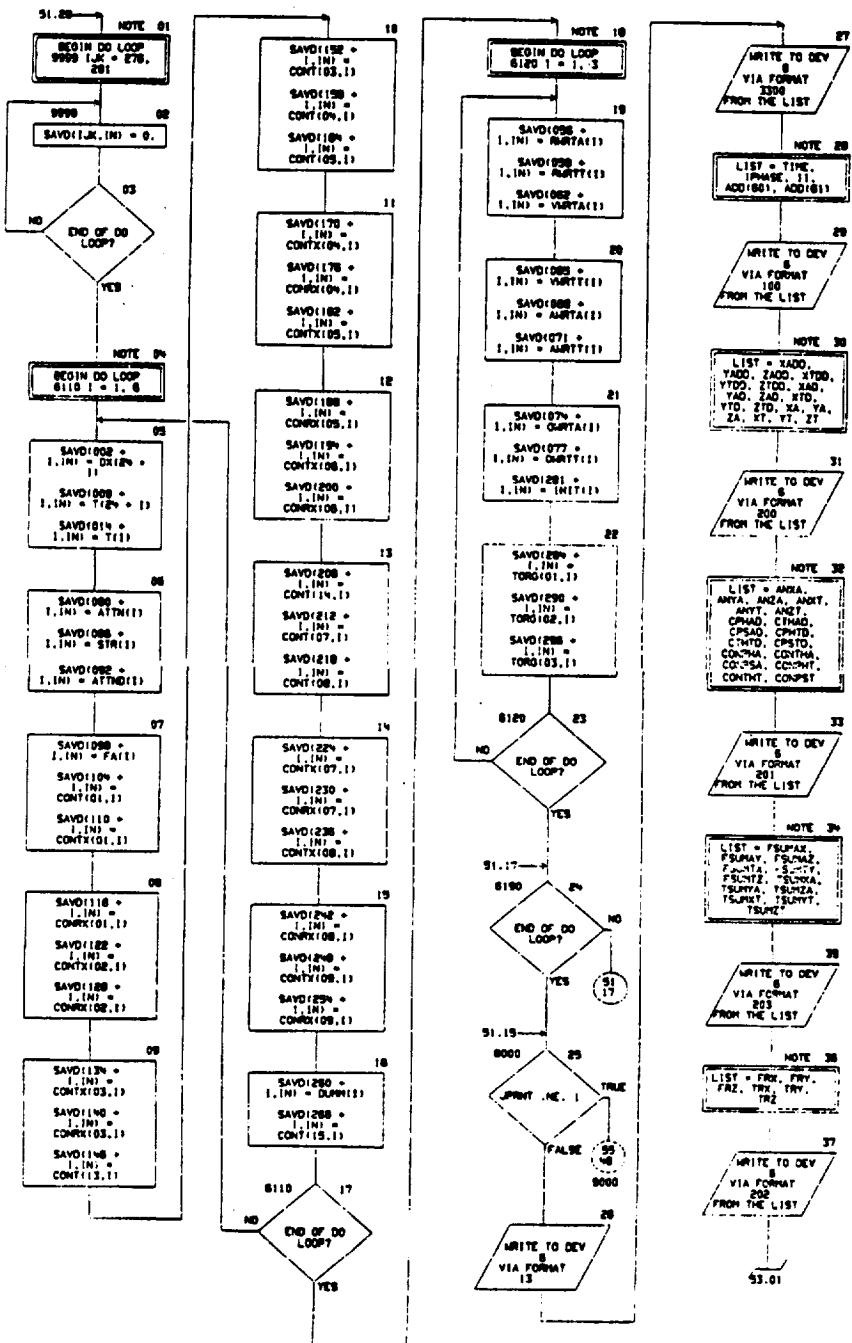
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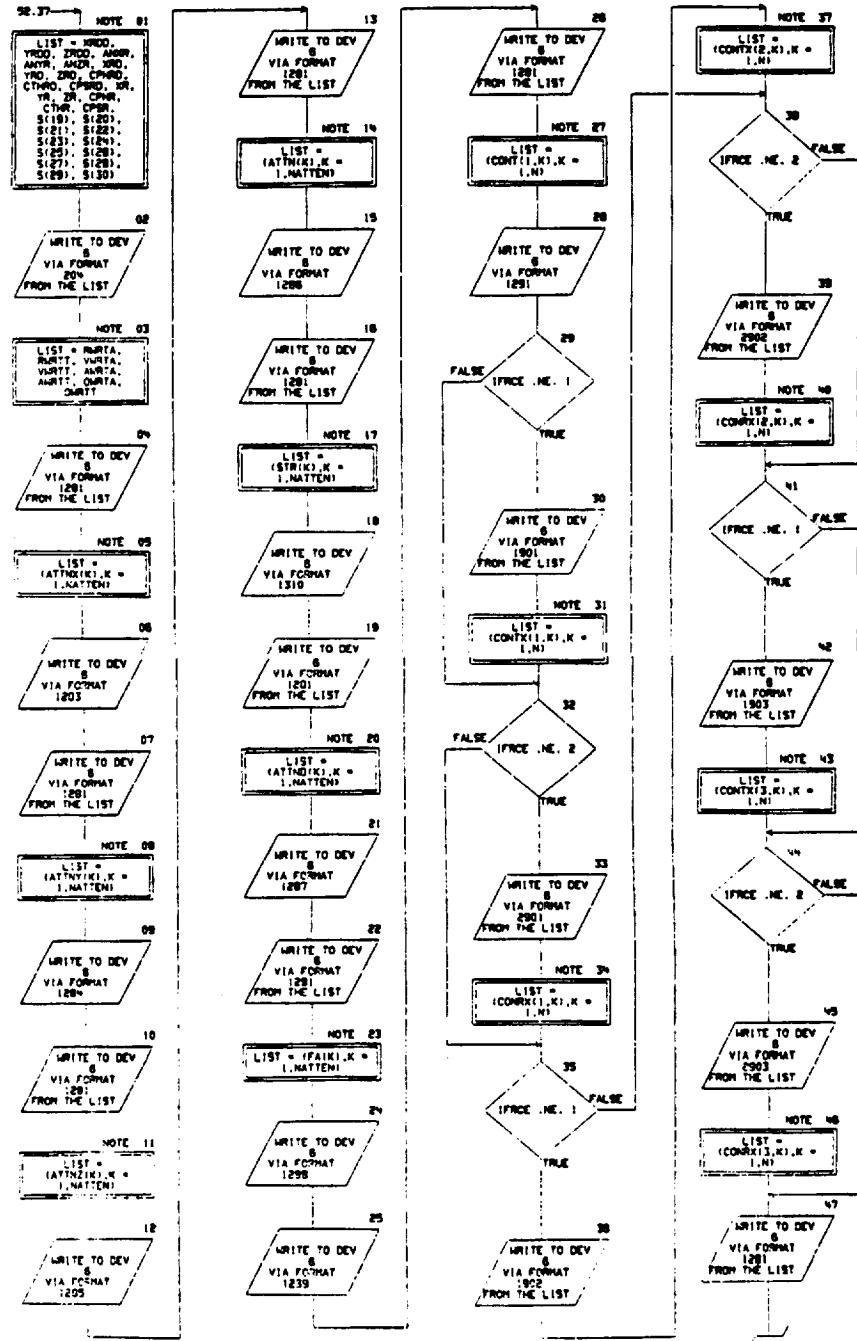
INTRODUCTION

03/22/76

AUTOMATION CHART SET - AFDD.FLD AFDD-FLOW

PAGE 50

**CHART TITLE - SUBROUTINE OUTPUT**



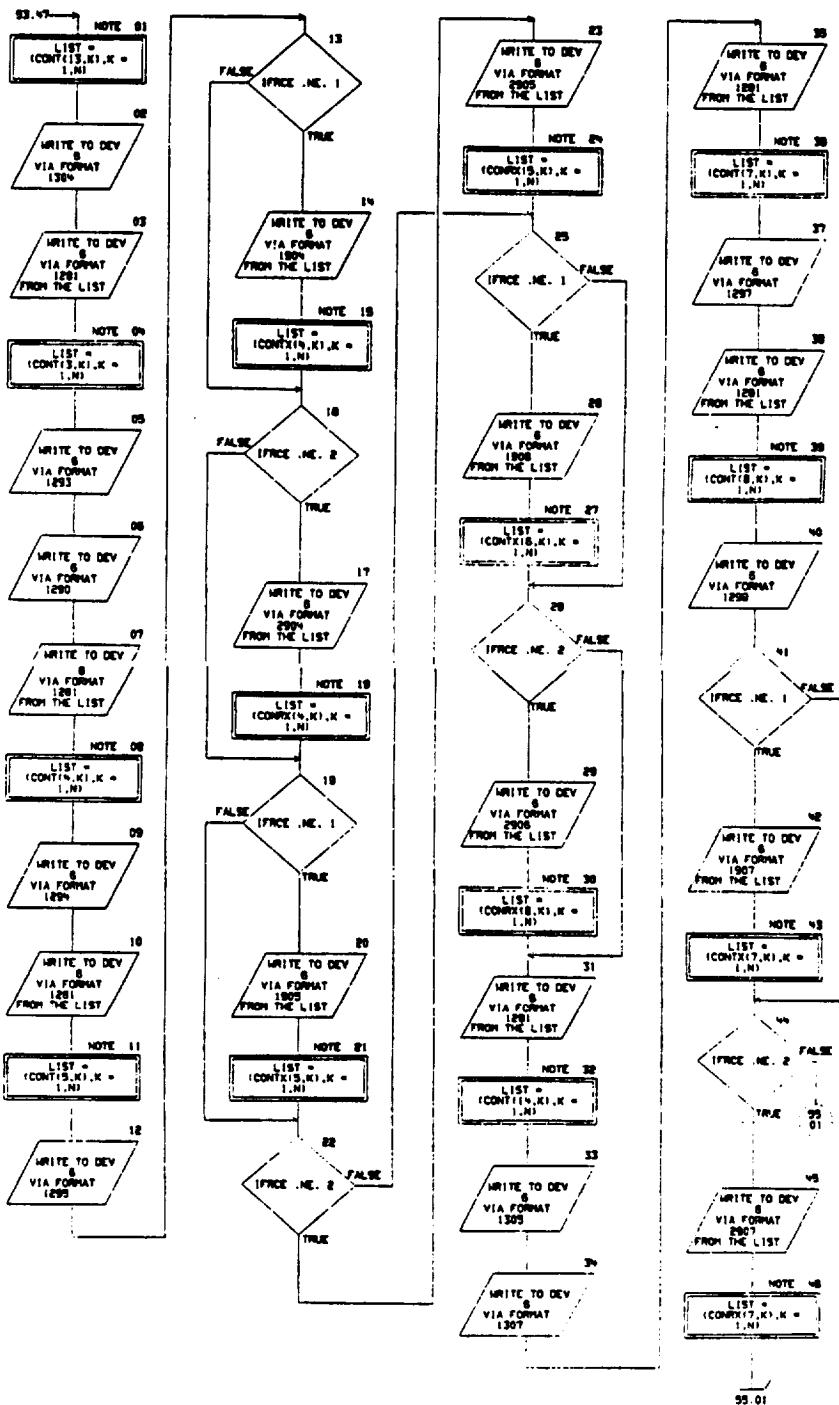


05/22/74

AUTOPLOT CHART SET - RP02.FLO RP02-PL04

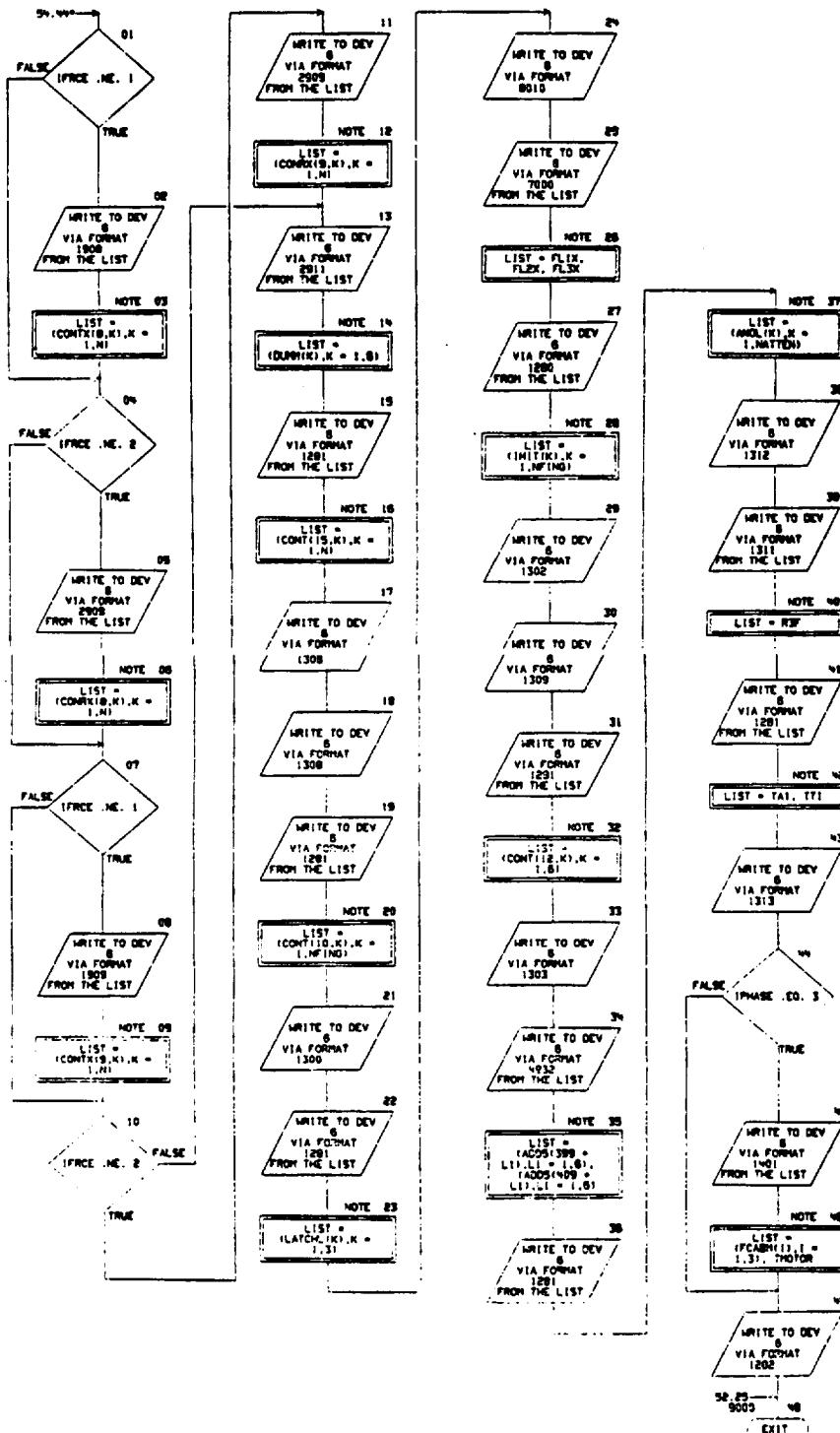
PAGE 54

CHART TITLE - SUBROUTINE OUTPUT





**CHART TITLE - SUBROUTINE OUTPUT**



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05/22/78

AUTOFLOW CHART SET - RFDD.FLD RFDD-FLOW

PAGE 58

CHART TITLE - NON-PROCEDURAL STATEMENTS

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DIMENSION (LATMIN),CONST(3)
,SI(2000)
,ADD(100)
DIMENSION ATTR(20),ATTRY(20),ATTRE(20),ATTRH(20),STR(20),FASK(20)
,ATTH(20),FAD(20),FAC(20),AJ(20),AK(20),TJ(20),TK(20),TH(20)
,TNE(20)
DIMENSION VARI(200),T(2000),A(15),B(15),C(90),D(30),E(15),F(10),
AA(5),AT(30),CO(10),SH(10)
DIMENSION ATTRD(8),ATTRYD(8),ATTRD0(8),ANBL(8)
COMMON/INAR3/ND,ART(3,20)
COMMON/LATCH/LATCH(3,4),CLATCH(3,20)
EQUIVALENCE(AAD(71),AL),(ADD(72),RADL)
DIMENSION ORI(1)(3),V(3),VI(3)
,INIT(20)
EQUIVALENCE(ORI(1),1),OR(1)
DIMENSION COMT(15,20)
EQUIVALENCE(ADD(1),COMT(1,1))
EQUIVALENCE(ADD(1),R1),(ADD(2),OFFJR),(ADD(3),OFFIR)
,(ADD(4),ZMR),(ADD(5),XMR),(ADD(6),YYIR),(ADD(7),ZZIR)
,(ADD(8),NFINB),(ADD(9),APR),(ADD(10),ASB),(ADD(11),BET)
,(ADD(12),CPB),(ADD(13),TPRO1),(ADD(14),CPDP)
,(ADD(15),SK)
,(ADD(16),RSB),(ADD(17),ARS),(ADD(18),AYS)
,(ADD(19),OISG),(ADD(20),ISTART)
EQUIVALENCE (T(11),XAI),(T(12),YAI),(T(13),ZAI),(T(14),XTI),(T(15),YT),
(T(16),ZTY),(T(17),OMEXAI),(T(18),OMDYAI),(T(19),OMEOZA),
(T(20),OMEXTI),(T(21),OMDYTI),(T(22),OMEZTI),
(T(23),PMAI),(T(24),PBT),(T(25),PPI),(T(26),PTI),
(T(27),PMT),(T(28),PBT),(T(29),PPI),(T(30),PTI),
(T(31),ZP),(T(32),ZD),(T(33),YD),(T(34),ZD),
(T(35),ZD),(T(36),YD),(T(37),ZD),(T(38),ZD),
(T(39),ZD),(T(40),ZD)
EQUIVALENCE (T(31),XRD),(T(32),YRD),(T(33),ZRD),(T(34),XR),(T(35),
YR),(T(36),ZR),(T(37),MR),(T(38),PR),(T(39),PR),(T(40),
QNSDR),(T(41),QNSDR),(T(42),QNSDR)
,(S145),(INIT(1))
EQUIVALENCE (DX(1),DXA),(DX(2),DYA),(DX(3),DZD),(DX(4),DXTD),
(DX(5),DYTD),(DX(6),DTZD),(DX(7),DXEXD),(DX(8),DNEYD),
,(DX(9),DNEZD),(DX(10),DXHTD),(DX(11),DNEYD),
,(DX(12),DNEZD),(DX(13),DHD),(DX(14),PMAD),
,(DX(15),PSAD),(DX(16),TMFD),(DX(17),PMFD),(DX(18),PSD)
,(DX(19),PFD),(DX(20),YFD),(DX(21),ZFD),
,(DX(22),ZD),(DX(23),YD),(DX(24),ZD),
,(DX(25),ZD),(DX(26),YD),(DX(27),ZD)
EQUIVALENCE (DX(28),XRD),(DX(29),YRD),(DX(30),ZRD),(DX(31),XR),
,(DX(32),YR),(DX(33),ZR),(DX(34),MR),(DX(35),PR)
,(DX(36),PR),(DX(37),MR),(DX(38),PR),(DX(39),PR),
,(DX(40),PR)
EQUIVALENCE (A18),XMA1),(A19),XCA1),(A16),YTA1),(A15),ZCA1),
,(A18),XTIA1),(A17),XZIA1),(A18),YZIA1),(A19),OFFJA1),
,(A18),OFFKA1),(A11),RA1)
EQUIVALENCE (B12),XPT1),(B13),XXIT),(B14),YYIT),(B15),ZZIT),
,(B16),XYIT),(B17),XZIT),(B18),YZIT),(B19),OFFJT1),
,(B10),OFFXT),(B11),RT1)
EQUIVALENCE (C11),NATTEN),(C12),DA1),(C13),DT1),(C14),ALPHA)
,(C15),THRT1),(C16),PRELD1),(C17),DELPRE1),(C18),BRATE)
,(C19),ISIMPL),(C14),IMONT)
,(C17),THAI),(C18),THOROI),(C19),JM199)
,(C15),EXT1),(S10),C81)
EQUIVALENCE (PLOT,E11)
,(S145),FRCSXA),(S120),FRCSYA),(S121),FRCSZA),(S122),FRCSXT1),
,(S123),FRCSYT),(S124),FRCSZT),(S125),FRCSXA),(S126),FRCSYA),
,(S127),FRCSZA),(S128),FRCSXT),(S129),FRCSYT),(S130),FRCSZT)

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SD 74-CS-0023

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Rockwell International



05/22/76

AUT: ON CHART SET - RFDD.FLG RFDD-FLOW

PAGE 57

CHART TITLE - NON-PROCEDURAL STATEMENTS

DIMENSION ST((10),F901(10),ATN1(10))  
EQUIVALENCE(S109),ST(1)(1),S1(79),F901(10)  
EQUIVALENCE (E(2),IPHASE),(E(3),STOP),(E(4),DELP1),(E(5),CASE),  
(E(6),LORPH),(E(7),DOLP),(E(8),DESLC),(E(9),JN),  
(E(10),ICASE)  
EQUIVALENCE (F(2),TDEM),(F(4),A3),(F(5),A6),(F(6),KA1),  
(F(7),A2),(F(8),AN),(F(9),A7)  
EQUIVALENCE (AA(2),THCOMA),(AA(3),PHCOMA),(AA(4),PSCOMA),  
(AA(5),ARXA),(AA(6),ARYA),(AA(7),ARZA),(AA(8),ADPA),  
(AA(9),ADTHA),(AA(10),ADPSA),(AA(11),TXA),(AA(12),TYA)  
(AA(13),TZA),(AA(14),OBANDA),(AA(15),DBAYA),  
(AA(16),DBANZA),(AA(17),FXA),(AA(18),REACT),  
(AA(19),BANKA),(AA(20),BANYA),(AA(21),BANZA)  
EQUIVALENCE (AT(2),DRHO),(AT(3),DY01),(AT(4),TREST),(AT(5),DRK),  
(AT(6),ARX1),(AT(7),ARY1),(AT(8),ARZ1),(AT(9),ADPH1),  
(AT(10),ADHT1),(AT(11),ADPS1),(AT(12),OBAND1),  
(AT(13),DBAN1),(AT(14),DBANZ1),(AT(15),THCOM1),  
(AT(16),PHCOM1),(AT(17),PSCOM1),(AT(18),REACT1),  
(AT(19),BANK1),(AT(20),BANY1),(AT(21),BANZ1),  
(AT(22),TX1),(AT(23),TY1),(AT(24),TZ1),(AT(25),FX1),  
(AT(26),PRX1),(AT(27),YMAX1),(AT(28),PRX1),  
(AT(29),IRS1),(AT(30),IVCH)  
EQUIVALENCE (VAR(1),A(1)),(VAR(2),B(1)),(VAR(3),C(1)),  
(VAR(4),D(1)),(VAR(5),E(1)),(VAR(6),F(1)),  
(VAR(13),AA(1)),(VAR(14),AT(1)),(VAR(15),CO(1)),  
(VAR(20),SS(1)),(VAR(21),T(1))  
DIMENSION XA(1)(3),RC03(3),XRA(1)(3),RC03A(3),XRA(1)(3),RVT(1)(3),  
GAM(1)(3),GAMH(1)(3),XRA(1)(3),RVT(1)(3),RVT(1)(3),SMRTA(3),  
RC02(3),RRTA(1)(3),VRA(1)(3),VRA(1)(3),OR(1)(3),VOR(1)(3),VORA(1)(3),  
VRTA(1)(3),VTA(1)(3),ORA(1)(3),OTA(1)(3),VTA(1)(3),VTA(1)(3),WTF(1)(3),  
VRT(1)(3),SVORT(1)(3),ORT(1)(3),GAMDH(3)(3),  
,GAMRH(3)(3),AMRTA(1)(3),DA(1)(3),DT(1)(3),VOA(1)(3),  
,GARTA(1)(3),XTRT(1)(3),RLC(1)(3),SRLC(1)(3),RRTT(1)(3),AMRT(1)(3),  
VOT(1)(3),VORT(1)(3),VMRT(1)(3),DURTT(1)(3)  
EQUIVALENCE (RC03(1),ADD(1)),(GAMH(1,1),GAMA(1)),(GAMEN(1,1),  
,GANE(1)),(GAMRH(1,1),GAMR(1)),(T(1)(0),DR(1)),(O(1)(1),T(1)(2))  
,(T(1)(1),T(1)(0)),(GAMH(1,1),GAMD(1)),(GAMH(1,1),GANT(1))  
,(RC03(1),ADD(1))  
COMMON/OUT/XA,R,V,TXR  
COMMON/VAR  
COMMON/RET/L0SS  
COMMON/TRANS/ GAM11,GAMA12,GAMA13,GAM211,GAM212,GAM213,GAM221,  
GAM222,GAM233,GAMT11,GAMT12,GAMT13,GAMT21,GAMT22,GAMT23,GAMT31,  
GAMT32,GAMT33,GAMR11,GAMR12,GAMR13,GAMR21,GAMR22,GAMR23,GAMR31,  
GAMR32,GAMR33,GAME11,GAME12,GAME13,GAME21,GAME22,GAME23,GAME31,  
GAME32,GAME33,GAMD11,GAMD12,GAMD13,GAMD21,GAMD22,GAMD23,GAMD31,  
GAMD32,GAMD33,GAMC11,GAMC12,GAMC13,GAMC21,GAMC22,GAMC23,GAMC31,  
GAMP32,GAMP33  
,GAMS11,GAMS12,GAMS13,GAMS21,GAMS22,GAMS23,GAMS31,GAMS32,GAMS33  
COMMON/INITIAL/ARM1,TIHEP,PULL,LTTEST,SLOPE  
,PRCEA,TLSA,11,IKAI,TYESH1,CONST  
COMMON/ANGLE/STHA,CTHA,SPHA,CPHA,SPSA,CPSA,  
,STH,CTH,SPH,CPH,SPS,CPST  
COMMON/IMARD/ILATH,RP2,XL4,IPS,XL3,FLATCH,TLATY,TLATZ,THUS,THUS  
COMMON/RECAL/S  
COMMON/CALCU/F0,FC,F1,TOR1,FS1,FS2,FS3,FCR1,FCR2,FCR3,ETAI,  
ETAZ,ETAS,FR1A,FR1B,FR1C,FR1D,FR1E,FR1F,FR1G,FR1H,FR1I,FR1J,  
VELB1,VELB2,VELB3,VELP,FRICP,FRIC1,FRIC2,FRIC3,PROBL  
COMMON/L00/YAMH1,YAMH2,YAMH3,XLCB1,XLCB2,XLCB3  
COMMON/FC/FSUMX,FSUMY,FSUMZ,TSUMX,TSUMY,TSUMZ,TSUMT,  
TSUMYT,TSUMZT,FSUMX1,FSUMY1,FSUMZ1,TSUMX2,TSUMY2,TSUMZ2,TSUMT2  
COMMON/OUT/FOX,FOT,POT,TOKX,TOKY,TOKZ,STRB1,STRB2,STRB3,STRB4,

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05/22/70

AUTM70N CHART SET - F700.FLG F700-FLG

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CHART TITLE - NON-PROCEDURAL STATEMENTS

FCX,FCY,FCZ  
COMMON/PULL/RETRAC  
COMMON/ION/IONT  
COMMON/DIA/THRE,PHME,PSME,THPE,PHPE,PSPE  
COMMON/HAROFT/MARINA,HAROYA,HAROZA,THRA,THRYA,THRZA  
COMMON/ADMEN/ADG  
COMMON /ADOLF/ ALP(100)  
DIMENSION ABS(10),ORD(10),SER(10),COS(10)  
EQUIVALENCE (ALP(10)),ABS(10),(ALP(10),ORD(10)),  
(ALP(10),SER(10),(ALP(10),COS(10)),  
(ALP(10),ITB(10)),(ALP(10),JNE)  
COMMON/ATTACH/AJ,AK,TJ,TK,FA,ATHD,STR,ATTN,THL,THE,ATTG  
,ATTB,ATTW,ATTZ  
COMMON/CLK/ATM,DR,(1150),ADDS(1000)  
COMMON/ANGLE/STAR,CTR,SPHR,SPHR,SPSR,SPSR  
COMMON/FORCH/FRL,FRY,FRZ,TRW,TRY,TRZ  
COMMON/TRANS/GR1,GR2,GR3,GR4,GR5,GR6,GR7,GR8,GR9  
COMMON/TIM/TIME  
DIMENSION TTA(13,80),TPI(13,3,4),RDA(3,4),RDT(3,4)  
,RDF(3,4),RS(3,4)  
DIMENSION TAI(3),TTI(3),TAC(3),TTIC(3),RCV(3)  
COMMON/STR/TRT(3,80)  
EQUIVALENCE (C(125),RSX),(C(125),RSY)  
DOUBLE PRECISION TTL1,TTL2  
COMMON /TITLE/ TTL1(10),TITLE(8)  
COMMON /CA/ VCA(13,10),VCAB(13,10),CABL(3,10),FCAB(3,10),  
THDOR,FCABH(10)  
EQUIVALENCE (D(80),SCR),(D(80),CRAB),(D(80),CRDR),(D(17),SH)  
COMMON /FRC/ CONTX(9,8),CONRY(9,8),INRC  
,DELST(10)  
EQUIVALENCE (9K,C(9))  
DIMENSION SUPR(10)  
COMMON /SUPR/ ANRA,ANYA,ANZA,CONPA,CONTHA,CONSA,  
ANBT,ANYT,ANZT,CONHT,CONHT,CONST  
COMMON /SAV/ SAY(100,10),SMA(10,10)(10)  
COMMON /REST/ CPHD,CTHD,CPSD,CPHD,CTHD,CPSTD,  
ANDR,ANVR,ANZR,CPHR,CTHD,CPHD,  
ANRA,ANRTT,ANRTY,ANRTT,ANRTA,ANRTT,  
ANRT,ANRTT,IPRT,IPRT,IPLOT,  
DPR,PLIX,PLX,PLX,PLIX,PLIY,PLIY,PL3Y,PL12,PL22,PL32,  
ANDL,REF,TAI,TTI  
COMMON /TBC/ TBC(3,8)  
REAL=LATCH  
COMMON /POLY/LATCH(3)  
13 FORMAT(1H1)  
3200 FORMAT(1H TIME(13.8,SH PHASE,112,34 11,115,54 XL E13.8,  
SH THP)E13.8)  
100 FORMAT(' XAO','E13.8,' YAO','E13.8,' ZAO','E13.8,  
' XTD','E13.8,' YTD','E13.8,' ZTD','E13.8,  
' XA ','E13.8,' YA ','E13.8,' ZA ','E13.8,  
' XT ','E13.8,' YT ','E13.8,' ZT ','E13.8 )  
200 FORMAT(' OXA ','E13.8,' OYA ','E13.8,' OZA ','E13.8,  
' ORX ','E13.8,' ORY ','E13.8,' ORZ ','E13.8/  
' PHAO ','E13.8,' THAO ','E13.8,' PHAD ','E13.8,  
' PHD ','E13.8,' THD ','E13.8,' PSTD ','E13.8/  
' PHA ','E13.8,' THA ','E13.8,' PSA ','E13.8,  
' PHT ','E13.8,' THT ','E13.8,' PST ','E13.8 )  
201 FORMAT(' TSAY ','E13.8,' TSAY ','E13.8,' TSAYZ ','E13.8,  
' FSAY ','E13.8,' FSAY ','E13.8,' FSAYZ ','E13.8/  
' TSAY ','E13.8,' TSAY ','E13.8,' TSAYZ ','E13.8,  
' TSAYT ','E13.8,' TSAYT ','E13.8,' TSAYZT ','E13.8 )

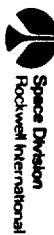
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05/22/79

AUTOMATION CHART SET - RP00.FLO RP00-FLOW

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CHART TITLE - NON-PROCEDURAL STATEMENTS

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203  FORMAT(' PRX ',E13.6,' PRY ',E13.6,' PRZ ',E13.6,
        ' TRX ',E13.6,' TRY ',E13.6,' TRZ ',E13.6 )
208  FORMAT(' XRD ',E13.6,' YRD ',E13.6,' ZRD ',E13.6,
        ' ADR ',E13.6,' ANR ',E13.6,' ANZ ',E13.6/
        ' XRD ',E13.6,' YRD ',E13.6,' ZRD ',E13.6,
        ' PRD ',E13.6,' TRD ',E13.6,' PDR ',E13.6/
        ' XR ',E13.6,' YR ',E13.6,' ZR ',E13.6,
        ' PR ',E13.6,' TR ',E13.6,' DR ',E13.6/
        ' PCAY ',E13.6,' PCAZ ',E13.6,' PCAY ',E13.6/
        ' PCAY ',E13.6,' PCAY ',E13.6,' PCAY ',E13.6/
        ' PCAY ',E13.6,' PCAY ',E13.6,' PCAY ',E13.6/
        ' PCAY ',E13.6,' PCAY ',E13.6,' PCAY ',E13.6 )
204  FORMAT(' MRTA1 ',E16.8,' MRTA2 ',E16.8,' MRTA3 ',E16.8/
        ' MRTT1 ',E16.8,' MRTT2 ',E16.8,' MRTT3 ',E16.8/
        ' VRTA1 ',E16.8,' VRTA2 ',E16.8,' VRTA3 ',E16.8/
        ' VRTT1 ',E16.8,' VRTT2 ',E16.8,' VRTT3 ',E16.8/
        ' AMRTA1 ',E16.8,' AMRTA2 ',E16.8,' AMRTA3 ',E16.8/
        ' AMRTT1 ',E16.8,' AMRTT2 ',E16.8,' AMRTT3 ',E16.8/
        ' OMRTA1 ',E16.8,' OMRTA2 ',E16.8,' OMRTA3 ',E16.8/
        ' OMRTT1 ',E16.8,' OMRTT2 ',E16.8,' OMRTT3 ',E16.8)
183  FORMAT(1H+, 'ATTN01()')
184  FORMAT(1H+, 'ATTN1()')
185  FORMAT(1H+, 'ATTN2()')
186  FORMAT(1H+, 'ATTN3()')
187  FORMAT(1H+, 'STR1()')
188  FORMAT(1H+, 'ATTND()')
189  FORMAT(1H+, 'FAIL()')
190  FORMAT(1H, .0E15.7)
191  FORMAT('***** CONTACT BETWEEN RING FINGERS AND TARGET FINGERS ')
192  FORMAT(1H+, 'FINGER-R')
193  FORMAT(1H+, 'FORCE-FTRX',.0E15.7)
194  FORMAT(1H+, 'FORCE-FTRY',.0E15.7)
195  FORMAT(1H+, 'FORCE-FTZ',.0E15.7)
196  FORMAT(1H+, 'FORCE-FRTZ',.0E15.7)
197  FORMAT(1H+, 'FORCE-FRRX',.0E15.7)
198  FORMAT(1H+, 'FORCE-FRTY',.0E15.7)
199  FORMAT(1H+, 'FORCE-FRTZ',.0E15.7)
200  FORMAT(1H+, 'FORCE-FRRZ',.0E15.7)
1304 FORMAT(1H+, 'DIS-1')
1303 FORMAT(1H+, 'FINGER-T')
1300 FORMAT('***** CONTACT BETWEEN RING AND TARGET FINGERS ')
1294 FORMAT(1H+, 'ANGLE-R')
1295 FORMAT(1H+, 'FINGER-T')
1296 FORMAT(1H+, 'FORCE-FTRX',.0E15.7)
1297 FORMAT(1H+, 'FORCE-FTRY',.0E15.7)
1298 FORMAT(1H+, 'FORCE-FTZ',.0E15.7)
1299 FORMAT(1H+, 'FORCE-FRTZ',.0E15.7)
1300 FORMAT(1H+, 'FORCE-FRRX',.0E15.7)
1301 FORMAT(1H+, 'FORCE-FRTY',.0E15.7)
1302 FORMAT(1H+, 'FORCE-FRTZ',.0E15.7)
1303 FORMAT(1H+, 'FORCE-FRRZ',.0E15.7)
1304 FORMAT(1H+, 'DIS-2')
1305 FORMAT(1H+, 'ANGLE-T')
1306 FORMAT(1H+, 'FINGER-A')
1307 FORMAT(1H+, 'FORCE-FTRX',.0E15.7)
1308 FORMAT(1H+, 'FORCE-FTRY',.0E15.7)
1309 FORMAT(1H+, 'FORCE-FTZ',.0E15.7)
1310 FORMAT(1H+, 'FORCE-FRTZ',.0E15.7)
1311 FORMAT(' RING TO RING CONTACT LOADS'
        ' FRRX1 ',E12.5,' FRRX2 ',E12.5,' FRRX3 ',E12.5,
        ' FRRX4 ',E12.5,' FRRX5 ',E12.5,' FRRX6 ',E12.5 )
1306 FORMAT(1H+, 'DIS-3')
1308 FORMAT('***** LATCH DISTANCE AND FORCES ')
1309 FORMAT(1H+, 'DELTAL')
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## CHART TITLE - NON-PROCEDURAL STATEMENTS

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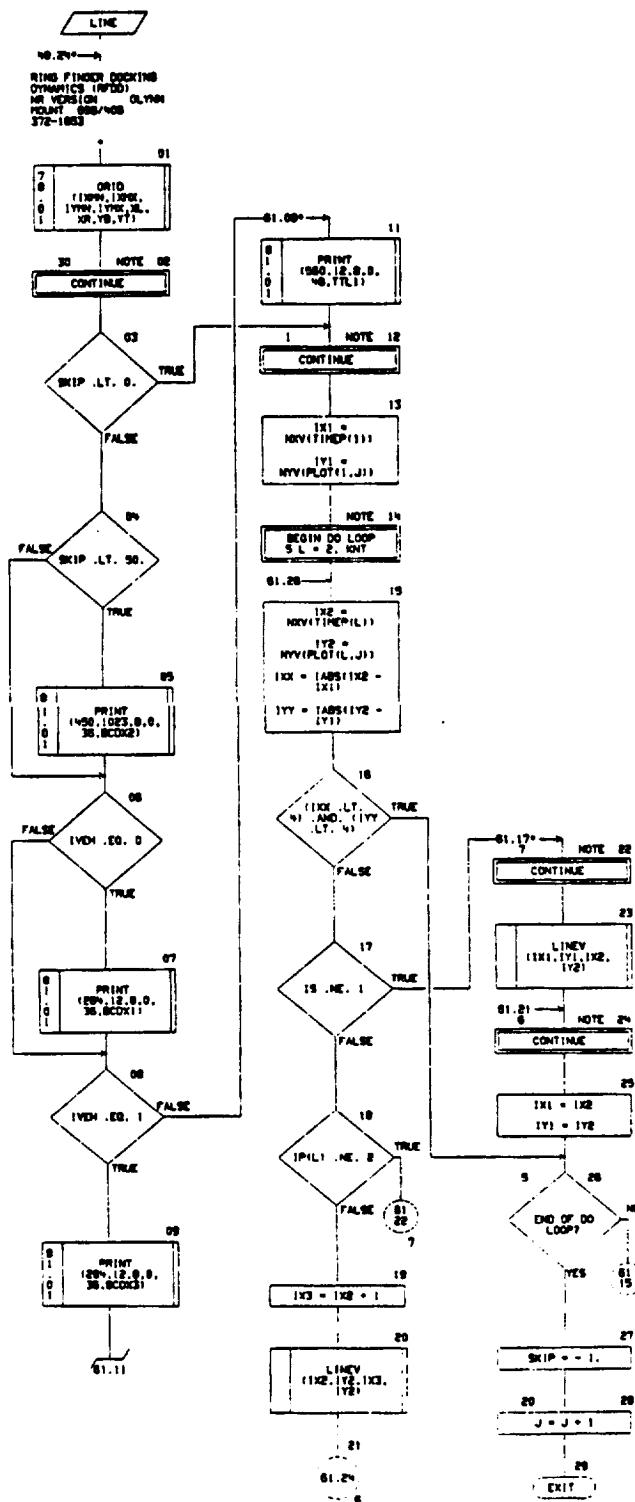
8010 FORMAT(1H,'LATCH ')
7000 FORMAT('LATCH LOADS ',' BEARING ',7X,3E17.6)
1200 FORMAT(1H,'SX.9113')
1302 FORMAT(1H,'INIT ')
1303 FORMAT(1H,'.... INTERACTION FORCE ON RING EXCLUDING ATTENUATOR FORCE
      ')
1303 FORMAT(1H4,'FPR,TRW')
4682 FORMAT('... CURRENT MAX ATTENUATOR FORCES FOLLOWED BY MIN ATTENUA
TOR FORCES ... /H 8E15.8/H 8E15.8')
1313 FORMAT(1H,'TA1,T11 ')
1311 FORMAT(1H,3E15.8)
1312 FORMAT('.... TARGET FIRER DISTANCE FROM CSM STRUCTURE ')
1491 FORMAT(1H,'... CABLE RETRACTION MECHANISM /H
      'TENSION FORCES : SX.3E14.7/H , 'MOTOR TORQUE : SX.1E16.7)
1202 FORMAT(1H,'')

```





CHART TITLE - SUBROUTINE LINEV(IYN,IXY,IYR,LYR,IL,NL,YD,YT,INT,SKIP,J)



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SD 74-CS-0023

FOLDOUT 1

FOLDOUT 2





## CHART TITLE • NON-PROCEDURAL STATEMENTS

```
DIMENSION PLOT(1110,19),TIMEP(1110),IP(1110)
COMMON/GRAP/PLOT,TIMEP,IP,15
DIMENSION BCDX1(19),BCDX2(19),BCDX3(19)
COMMON/CAS/CASE
DIMENSION VAR(2400)
COMMON VAR
EQUIVALENCE (VAR(190),WEN)
COMMON/TITLE$/TTL1(2)
DATA BCDX1 / NH DO,WHCKIN,WHD DT,WHMHI,WCS ,NH- C,
      WHASE ,WHD, ,WHD /
DATA BCDX2 / NH TIN,NHE -,WHSECO,WHD ,S1H /
DATA BCDX3 / NH DO,WHCKIN,WHD DT,WHMHI,WCS ,NH- C,
      WHASE ,WHD, ,WHD /
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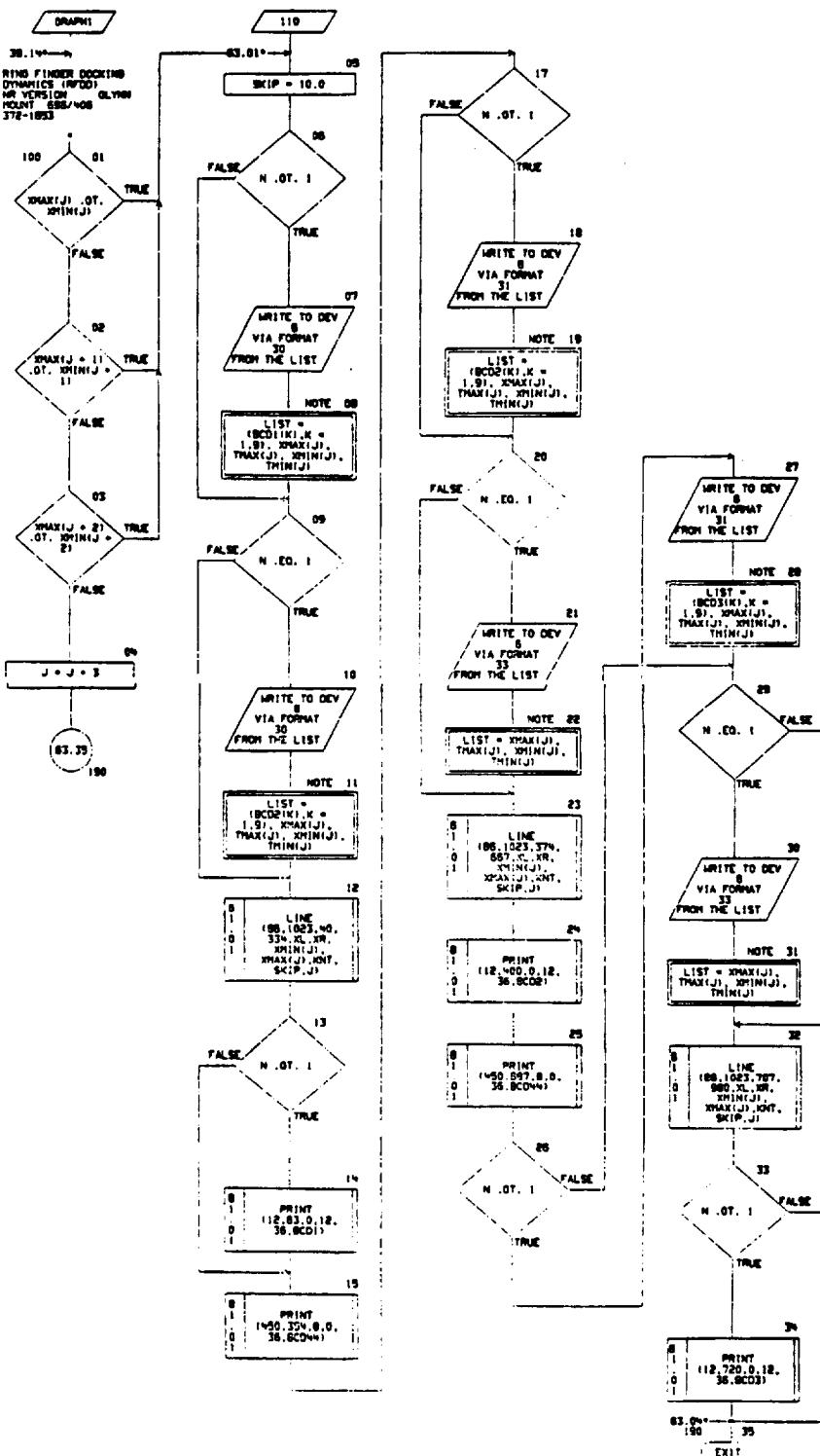


05/22/79

AUTOMATION CHART SET - RFDD.FLO RFDD-FLW

PAGE 63

CHART TITLE - SUBROUTINE GRAPHIN(BCD1,BCD2,BCD3,INT,SKIP,J)



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SD 74-C5-0023



```
DIMENSION INC(10),MAX(15),MIN(10),DCD(10),DCD(10),
MIN(15),MAX(15),MIN(15),MAX(15)
COPON /GRAPH/ XL,SR,MR,MAX,MIN,THIN,THICK
DATA SC004 / W1 T1H,NE - ,W1RCD,4W03 .3P1H /
FORMAT/102,SAV,P01K,E14,7,01
FORMAT/102,SAV,21W,E14,7,01
FORMAT/102,SAV,21W,E14,7,01
FORMAT/102,SAV,21W,E14,7,01
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30
31
32
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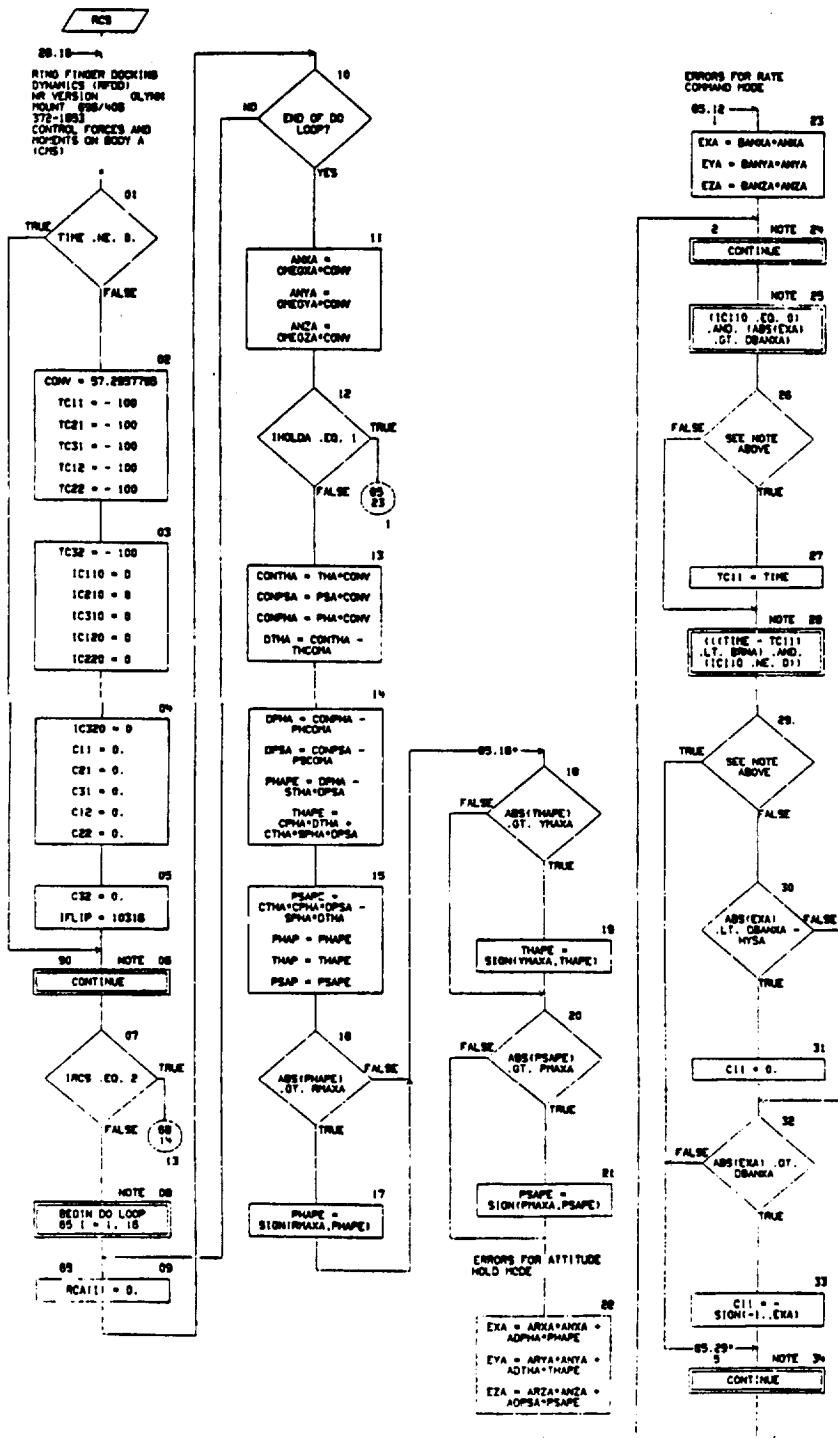
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05/22/76

AUTOMATION CHART SET - RFD0, FLO RFD0-FLOW

PAGE 00

CHART TITLE - SUBROUTINE RCS



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FOLDOUT PAGE 2



FOLDOC DRAWING

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- 261 -

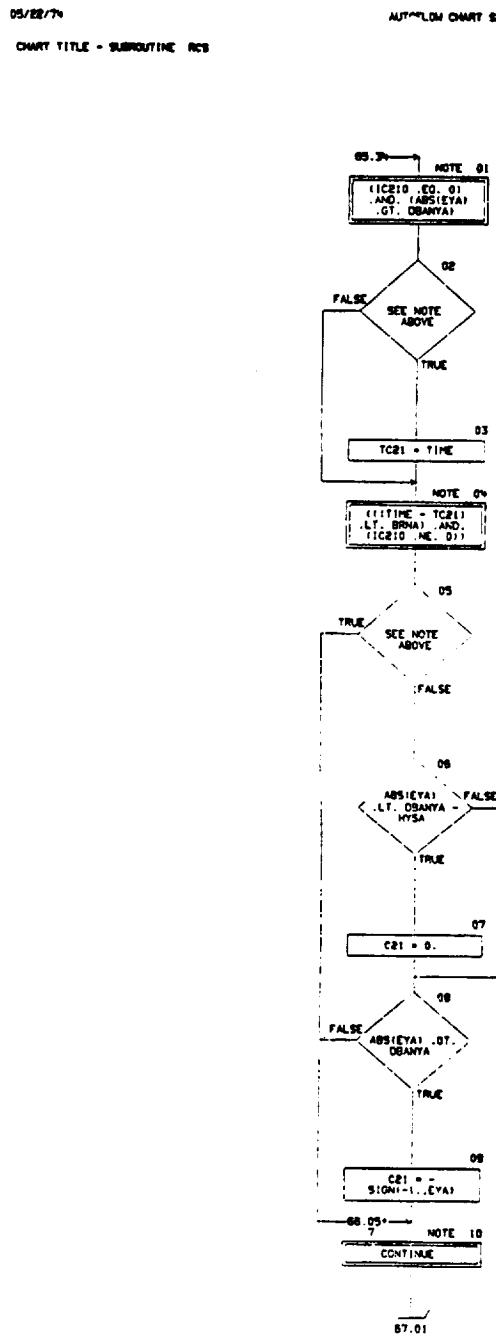
SD 74-CS-0023

05/22/74

CHART TITLE - SUBROUTINE ACS

AUTOFLOW CHART SET - AFDD.FLO AFDD-FLOW

PAGE 08



Special Division  
Rockwell International

FOLDOC DRAWING

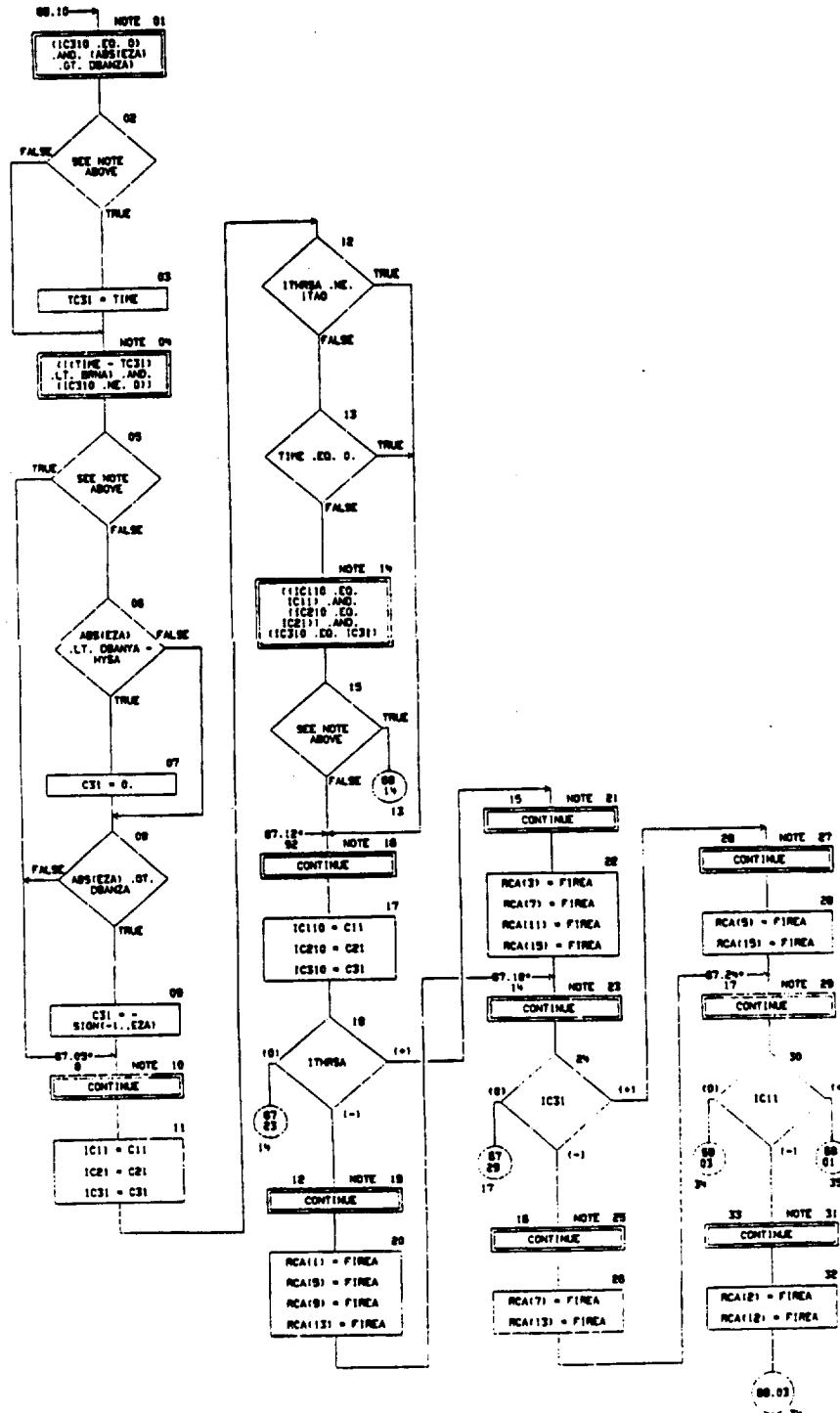
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05/25/74  
CHART TITLE - SUBROUTINE RCS

AUTOMATION CHART SET - RFD0.FLO RFD0-FLOW

PAGE 87



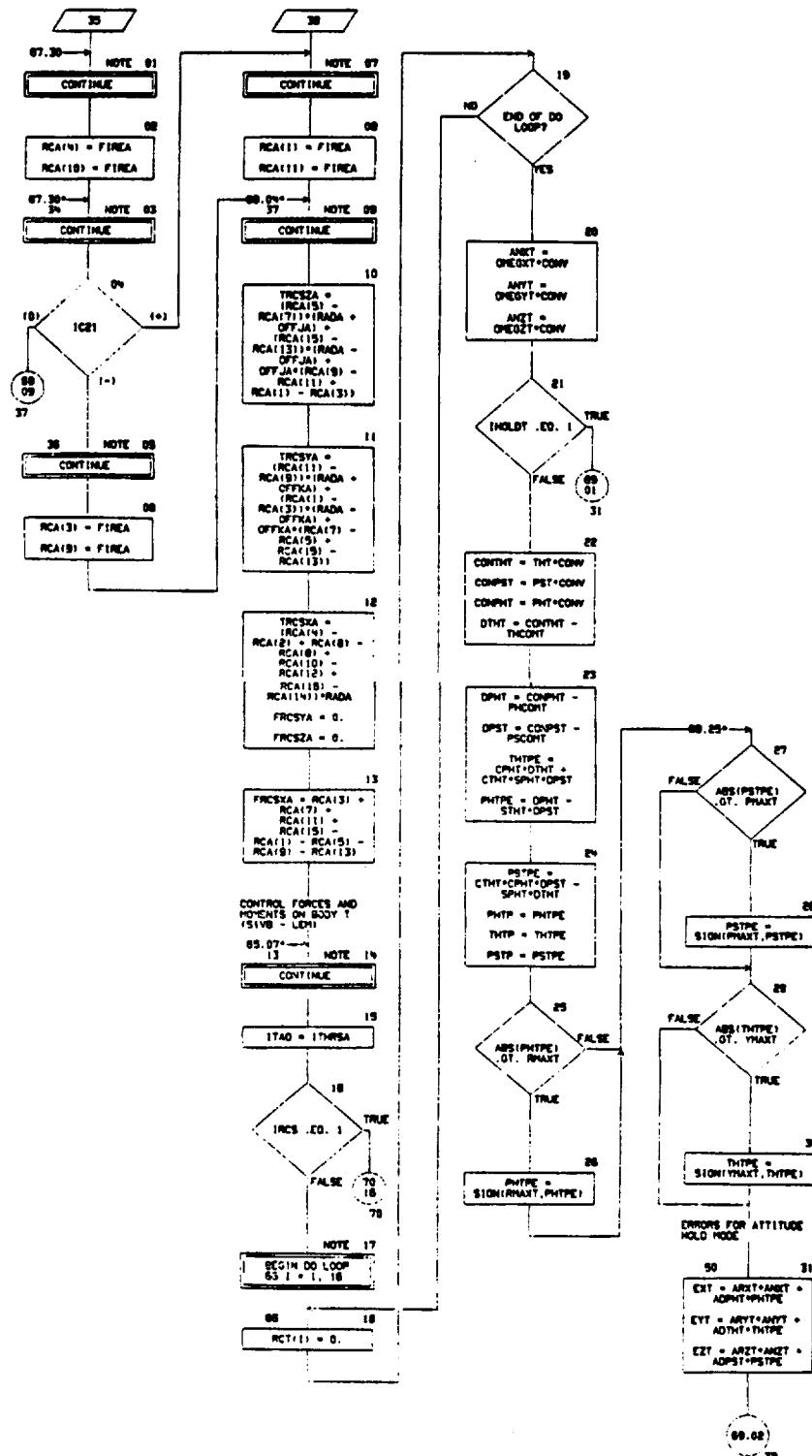


05/22/79

AUTOMATION CHART SET - RFDD.FLD RFDD-FLOW

PAGE 68

CHART TITLE - SUBROUTINE RCS

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SD 74-C5-0023





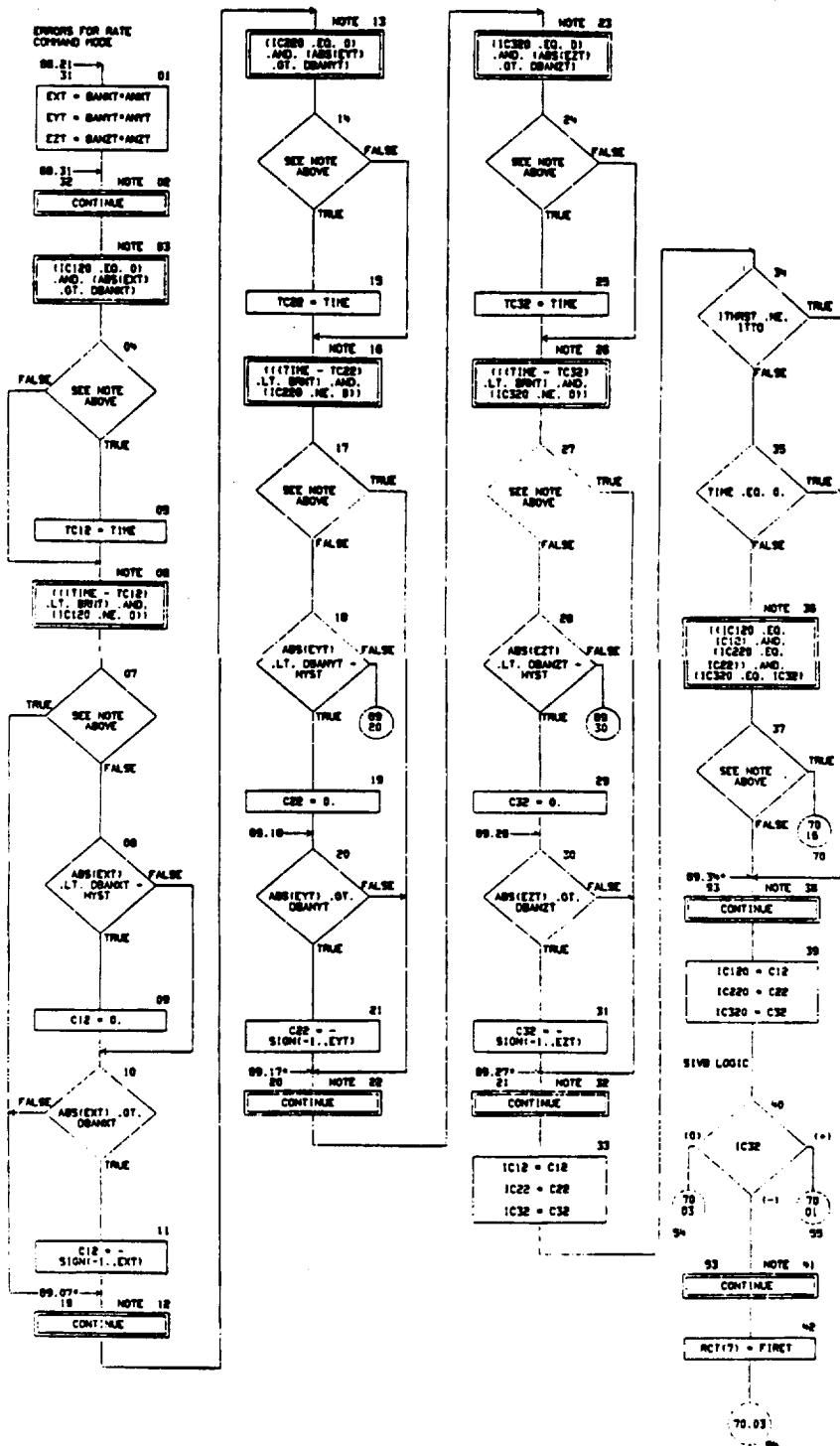
FOLIO 10

03/22/14

**CHART TITLE - SUBROUTINE PC3**

AUTOMATIC CHART SET - RFDG, FLD RFDG-FLD

Page 5



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SB 74-CS-0023



FOLLOWUP

05/22/79

AUTOPLOT CHART SET - RFDD.FLO RFDD-FLOW

PAGE 78

CHART TITLE - SUBROUTINE RCS

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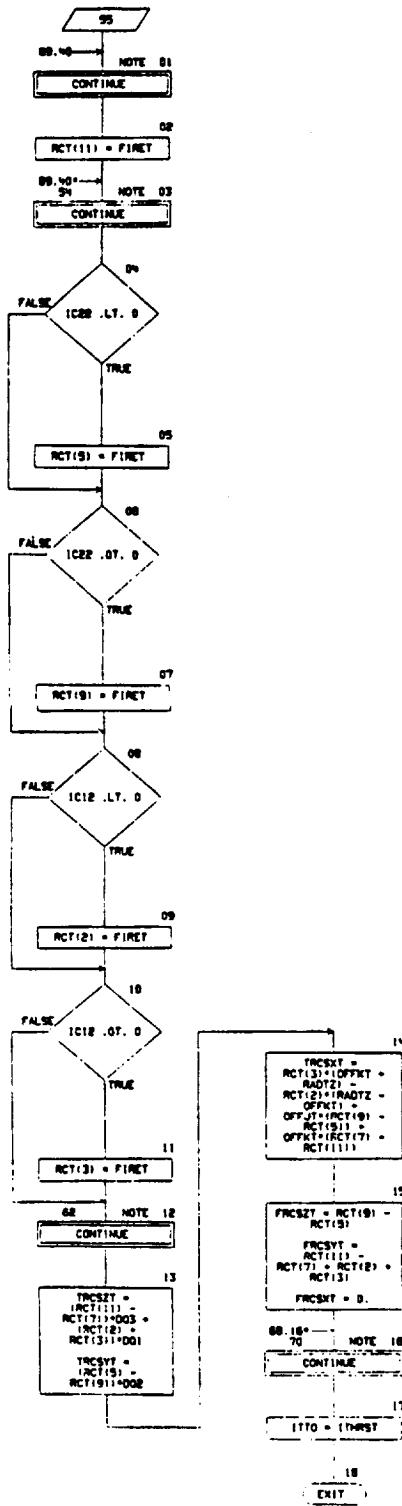
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- 269 -

SD 74-CS-0023

MULDOUR

2





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DIMENSION VAR(100),T(2000),A(15),B(15),C(50),D(30),E(15),F(10),
      AA(15),AT(30),CC(10),BB(15)
      ,CONST(3)
      ,RCA(15),RCT(15),S(2000),ADD(100)
EQUivalence T(11),KA1,T(12),YA1,T(13),ZA1,T(14),YT1,T(15),YT1,
      T(16),ZT1,T(17),OBRA1,T(18),OBRYA1,T(19),OBRS2A,
      T(10),OBRS2T1,T(11),OBRS2T1,T(12),OBRS2T1,
      T(13),THA1,T(14),PA1,T(15),PA1,T(16),TH1,
      T(17),PH1,T(18),PST1,T(19),PH1,T(20),YP1,
      T(21),DP1,T(22),BD1,T(23),YD1,T(24),ZD1,
      T(25),XD1,T(26),YD1,T(27),ZD1,T(28),ZD1,
      T(29),YT1,T(30),ZT1
EQUIVALENCE A(12),KA1,A(13),XA1,A(14),YY1,A(15),ZZ1A,
      A(16),XY1,A(17),Z2A,A(18),YZ1,A(19),OFF1A,
      A(10),OFF2A,A(11),RA1
EQUivalence B(12),BY1,B(13),BX1,B(14),YY1T1,B(15),ZZ1T1,
      B(16),XY1T1,B(17),XZ1T1,B(18),YZ1T1,B(19),OFF1T1,
      B(10),OFF2T1,B(11),RT1
EQUivalence C(12),TIP1,C(13),BC1,C(14),APPL1,C(15),PA1,
      C(16),BL2,C(17),BT1,C(18),SA1,C(19),PB1,C(10),ALCS1
      ,C(11),BD1,C(12),BL1,C(13),PC1,C(14),LCB1,
      C(15),XA1,C(16),BL2,C(17),DA1,C(18),DL1
      ,C(19),THRD1,C(20),BN1S1B1
      ,ZETA,C(21),,TARK,C(22)
EQUivalence D(12),PREPR,D(13),CSTOP,D(14),DNU,D(15),DRP1,
      D(16),PRESH,D(17),STOPR,D(18),FCOMB,D(19),CAD1,
      D(10),CK1,D(11),STOPH,D(12),PH1,D(13),FLPFC,
      D(14),CAK1,D(15),E11,D(16),E12,D(17),FCMP
      ,D(18),ADK1
EQUIVALENCE E(12),IPABE1,E(13),STOP1,E(14),IPLOT,E(15),ITABLE1,
      E(16),IPAPM,E(17),DOLP,E(18),DESLC,E(19),JN1,
      E(10),ICASE
EQUIVALENCE F(12),TNSH1,F(13),H1,F(14),A31,F(15),AS1,F(16),KA1,
      F(17),AB1,F(18),AN1,F(19),AT1
EQUIVALENCE AA(12),THCOMA,AA(13),PHCOMA,AA(14),PSCOMA,
      AA(15),ARMA1,AA(16),ARVA1,AA(17),ARZA1,AA(18),ADPA1,
      AA(19),ADTHA1,AA(10),ADPSA1,AA(11),RAD1,
      AA(12),FIREA,AA(13),BRPA1,AA(14),OBRA1,
      AA(15),OBRYA1,AA(16),OBRS2A1,AA(17),THA1,
      AA(18),REACTA,AA(19),BANIA1,AA(20),BANYA1,
      AA(21),BANC1,AA(22),IR1
      ,AA(23),PMAXA1,AA(24),PMXA1,AA(25),YM1A1
EQUIVALENCE AT(12),RADOT1,AT(13),RADT2,AT(14),PIRET1,AT(15),BRNT1
      ,AT(16),ARNT1,AT(17),ARYT1,AT(18),ARZT1,AT(19),ADNT1,
      AT(10),ADNT1,AT(11),ADPT1,AT(12),OBANNT1,
      AT(13),OBANNT1,AT(14),OBANCT1,AT(15),THECT1,
      AT(16),PNCNT1,AT(17),PBCNT1,AT(18),REACTT1,
      AT(19),BANT1,AT(20),BANTT1,AT(21),BANT2,
      AT(22),DOL1,AT(23),DOL2,AT(24),DOL3,AT(25),THNET,
      AT(26),PMXT1,AT(27),PMXT2,AT(28),PMXT3,
      AT(29),IPCS1,AT(30),IVCH1
EQUIVALENCE S(11),C111,S(12),C211,S(13),C311,S(14),C121,S(15),C221
      ,S(16),C321,S(17),TC111,S(18),TC211,S(19),TC311,S(10),TC121,
      S(111),TC221,S(121),TC321,S(13),IC1101,S(14),IC2101,S(15),IC3101
      ,S(16),IC2201,S(17),IC3201,S(18),LC3201
      ,S(19),FRC21A1,S(120),FRC21A1,S(121),FRC21A1,S(122),FRC21T1,
      S(123),FRC21T1,S(124),FRC22T1,S(125),TRCS1A1,S(126),TRCS1A1,
      S(127),TRCS2A1,S(128),TRCS2T1,S(129),TRCS2T1,S(130),TRCS2T1,
      S(131),TRPSA1,S(132),TRHST1,S(133),THOLDA1,S(134),THOLDT1
      ,S(140),TAO1,S(141),TTD1
      ,ADD175,MYPA1,ADD176,MYST1
EQUIVALENCE (VAR(11),A(11)),(VAR(15),B(11)),(VAR(31),C(11)),
      (VAR(11),D(11)),(VAR(11),E(11)),(VAR(12),F(11))

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- 271 -

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2



## CHART TITLE - NON-PROCEDURAL STATEMENTS

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(VAR(130),AA(1)),(VAR(181),AT(1)),(VAR(191),CO(1)).

COPION VAR
COPION/ELIN/TIME,DX(150),AD05(1000)
COPION/TRANS/ GAMA11,DAHA12,GAMA13,DAHA21,DAHA22,DAHA23,DAHA31,
DAHA32,DAHA33,DAH11,DAH12,DAH13,DAH21,DAH22,DAH23,DAH31,
DAH32,DAH33,DAE11,DAE12,DAE13,DAE21,DAE22,DAE23,DAE31,
DAE32,DAE33,DAE011,DAE012,DAE013,DAE021,DAE022,DAE023,DAE031,
DAE032,DAE033,DAHC11,DAHC12,DAHC13,DAHC21,DAHC22,DAHC23,DAHC31,
DAHC32,DAHC33,DAHP11,DAHP12,DAHP13,DAHP21,DAHP22,DAHP23,DAHP31,
DAHP32,DAHP33

COPION/MCAL/S
COPION/INITIAL/ANM1,TIMEP,INULL,JTEST4,SLOPE
,PROBEA,TLSA,11,IK1,TESH1,CONST
COPION/LCO/YAM1,YAM2,YAM3,XLCB1,XLCB2,XLCB3
COPION/CLK/FC/FC,FI,FI,FC1,FC2,FC3,FC4,FC5,FC6,FC7,FC8,FC9,FC10
ET42,ET43,ET44,ET45,ET46,ET47,ET48,ET49,ET50,ET51,ET52,ET53,ET54,ET55,ET56,ET57,ET58,ET59,ET5A1,
VEL1,VEL2,VEL3,VELP,VELCP,VELCP,VELC2,VELC3,PROSEL
COPION/ANGLE/STRA,CTRA,SPRA,CPRA,SPSA,CPSA,
STRT,CTRT,SPRT,DRRT,SPST,CPST

COPION/ERR/THAP,PSAP,PSPP,THTP,PHTP,PHTP
COPION/ADDEN/400

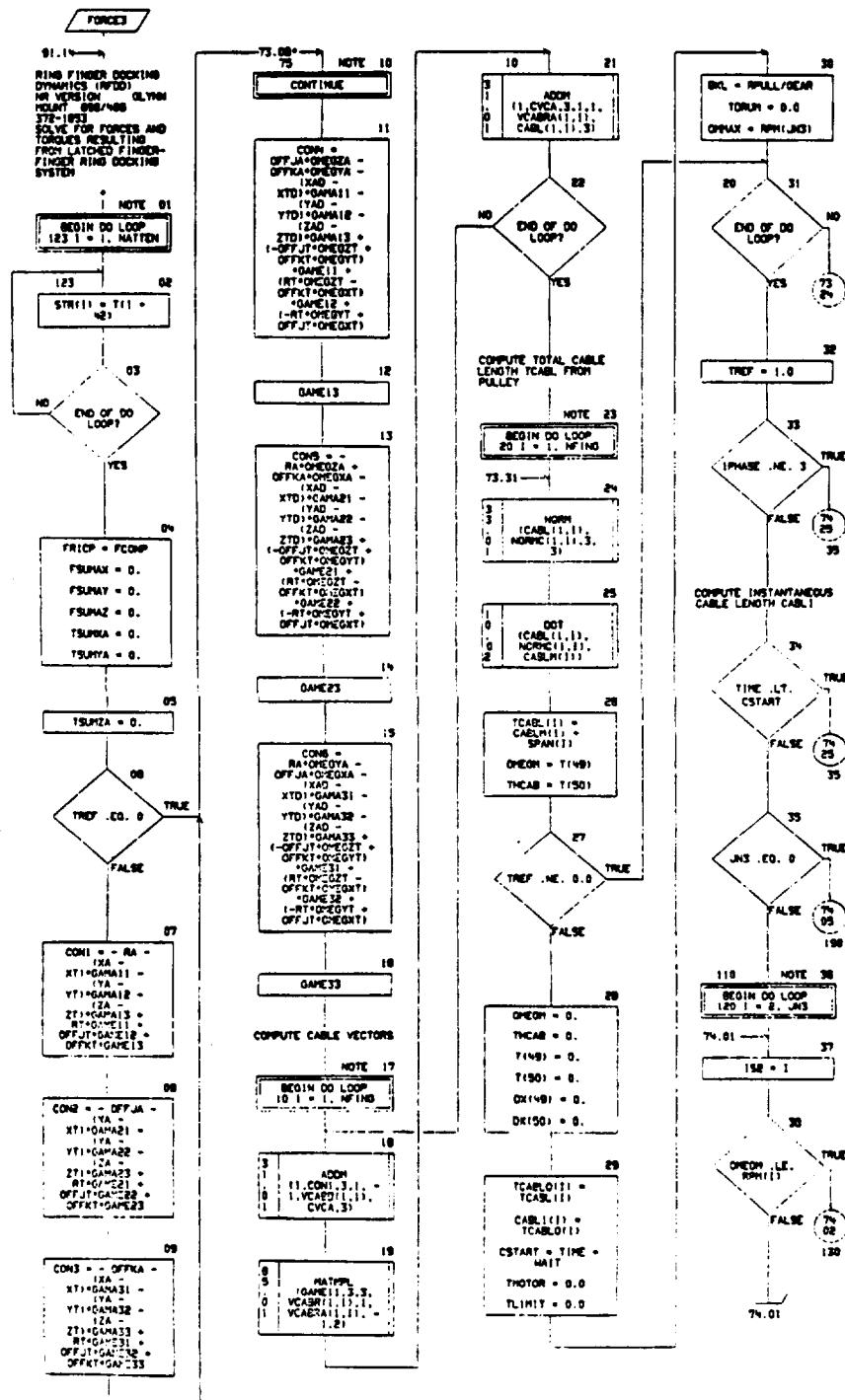
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**CHART TITLE • SUBROUTINE FORCED**



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SD 74-CS-0023



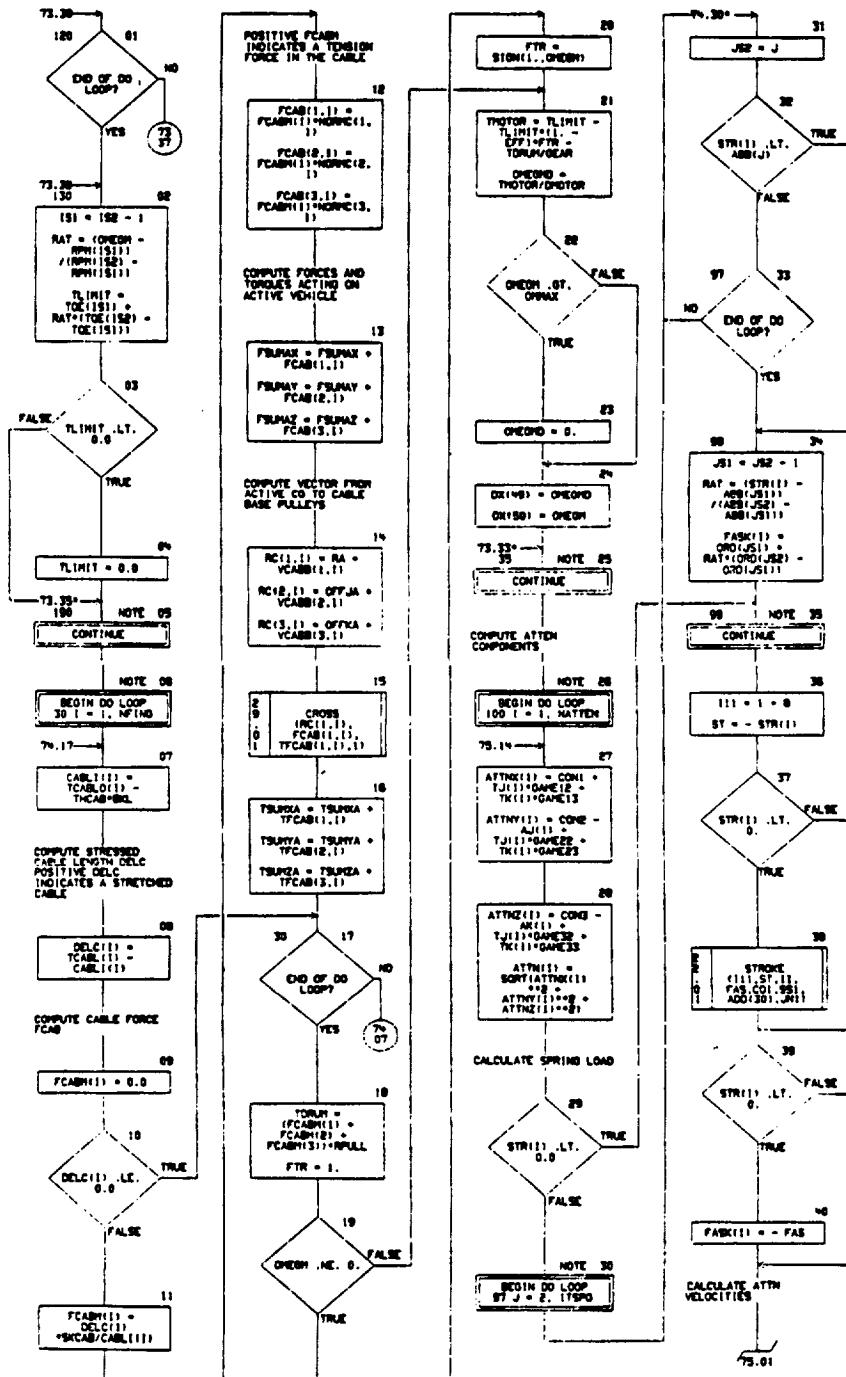


05/08/2014

**AUTIFLOW CHART SET - MFCD.FLO MFCD-FLOW**

PAGE 7

**CHART TITLE - SUBROUTINE FORCES**





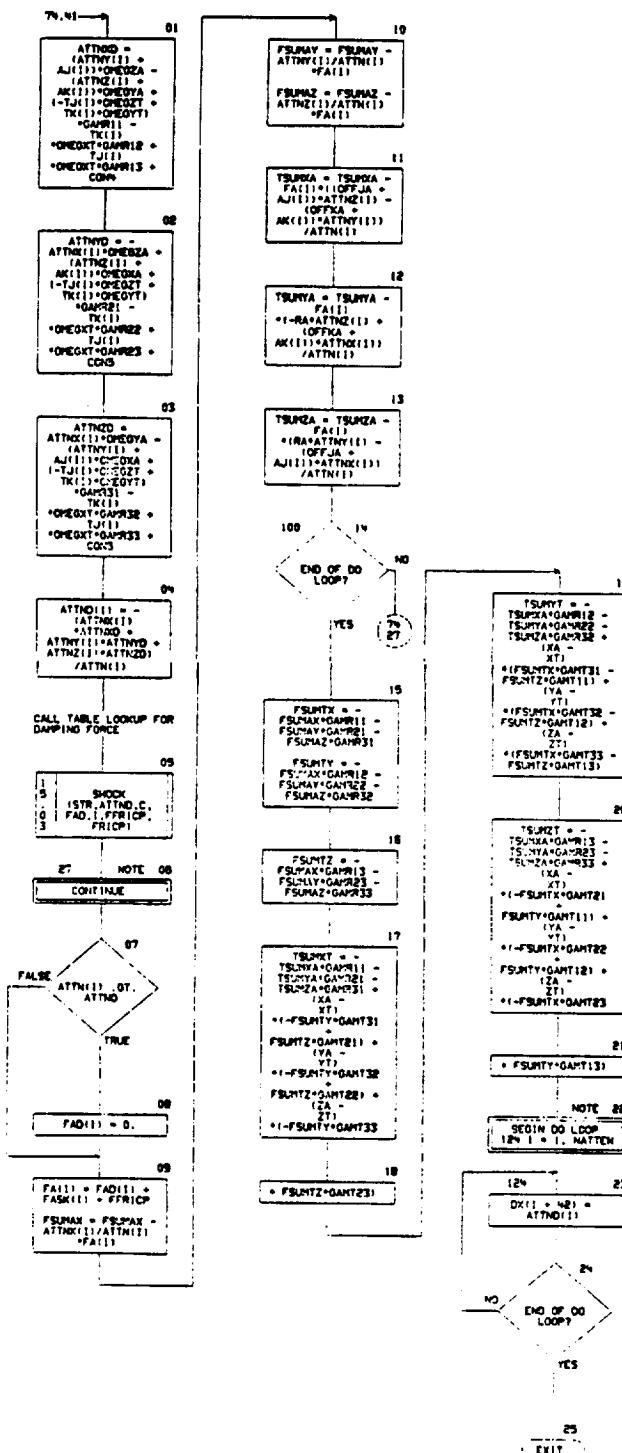
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05/22/79

CHART TITLE - SUBROUTINE FORCES

AUTOMATION CHART SET - AFDO.FLO AFDO-FLOW

PAGE 75





**CHART TITLE - NON-PROCEDURAL STATEMENTS**





## CHART TITLE - NON-PROCEDURAL STATEMENTS

05/22/74

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ETAR, ETAS, FRTIA, FRT2A, FRT3A, TS1, TS2, TS3, FRT10, FRT20, FRT30,  
 VELB1, VELB2, VELB3, VELP, FMC1, FMC2, FRC3, PROBEL  
 COMMON/FORC/FSAW, FSAY, FSAY2, TSUPKA, TSUFTA, TSUFTA, TSUPKT,  
 TSUFTT, TSUFTZ, FSUFTX, FSUFTY, FSUFTZ  
 COMMON /LOG/YAH1, YAH2, YAH3, YACB1, XLCB2, XLCB3  
 COMMON/OUT/FOT, FOY, FOZ, TORX, TORY, TORZ, STRB1, STRB2, STRB3, STRR,  
 FEX, FCY, FCZ  
 COMMON/LATCH/ALATCH13, M1, CLATCH13, 201  
 DIMENSION 0120, 61  
 EQUIVALENCE (AD118), NF(100)  
     . (D118), SPAN111, (D1151), ONE(01), (D1161), NFPL1, 1.  
     (D1181), SKCAB1, (D1191), HA111  
     (D1182), TREF1  
     . (D1211), EFF1, (D1231), SEAR1, (D1281), DROTOR1  
 EQUIVALENCE (C1251), GAPA1, (C1181), RATIO1  
 COMMON/DROUT/ETA, TOC, ZDC  
 COMMON/FULL/NETRAC  
 COMMON/HARDT/HARDTA, HARDYA, HARDZA, THRAA, THRYA, THRAZ  
 COMMON/DV1EN/C011, C012, C013, CTR13, 401, CTR13, 201  
 COMMON /CAV/ VCAR13, 101, VCARB13, 101, CAB13, 101, FCAB13, 101  
 TROTOR, FCABH101  
 NEAL, NV, NORIC  
 DIMENSION CYCA131, CABMH101, SPAN1101, NORIC13, 101.  
 CABL11101, DELC1101, RC13, 101, TCAB13, 101  
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 COMMON/RECAL/S122851  
 EQUIVALENCE (S11611), TORUR1

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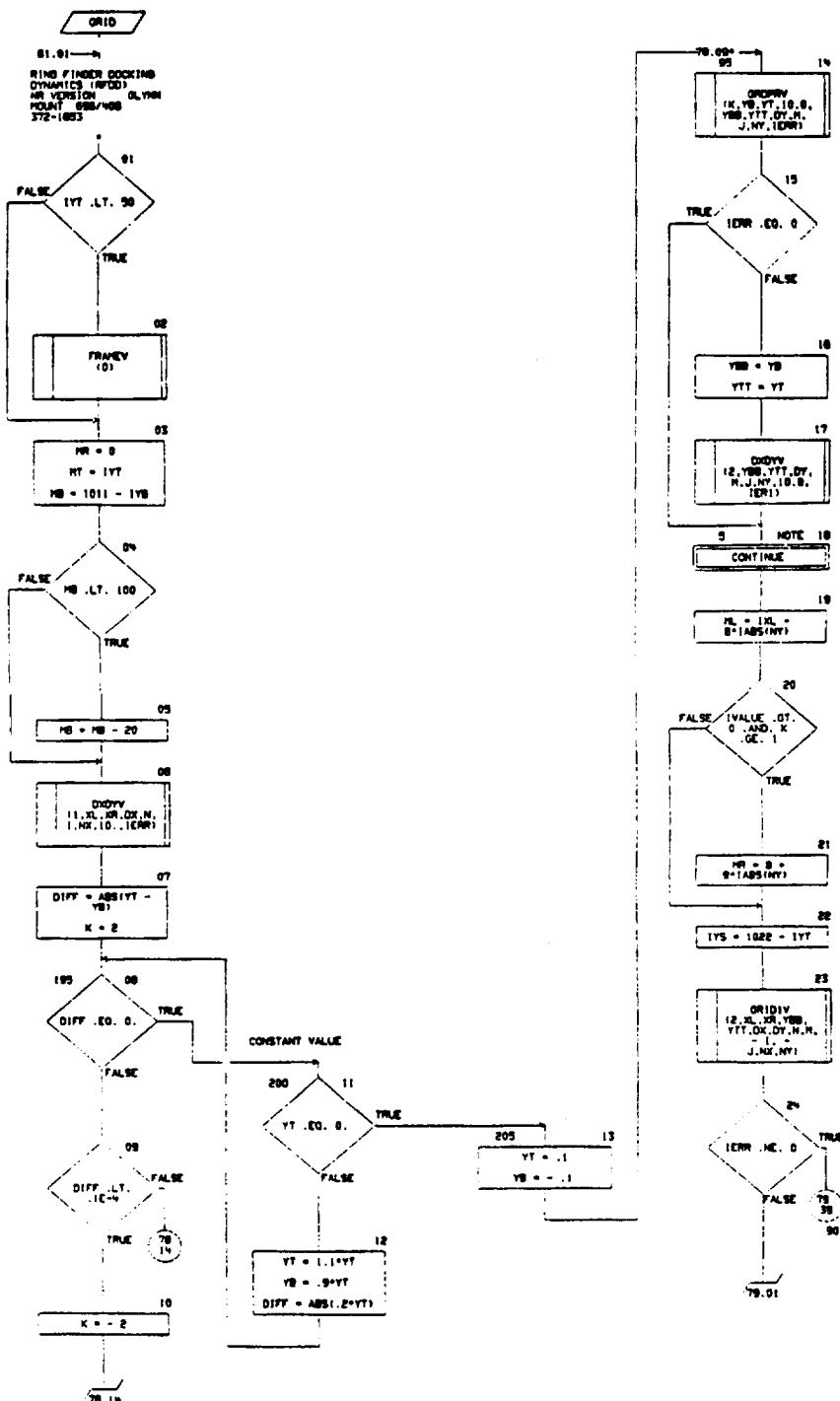


FOLDOUT FRAME 1

05/25/78 AUTONOMOUS CHART SET - AFDD.FLD AFDD-FLOW

PAGE 70

CHART TITLE - SUBROUTINE GRID(XL,XR,YT,YY,XL,XR,YB,YT)



OPTIONAL PAGE E  
OF POOR QUALITY

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FOLDOUT FRAME 2  
FOLDOUT FRAME 3

SD 74-CS-0023



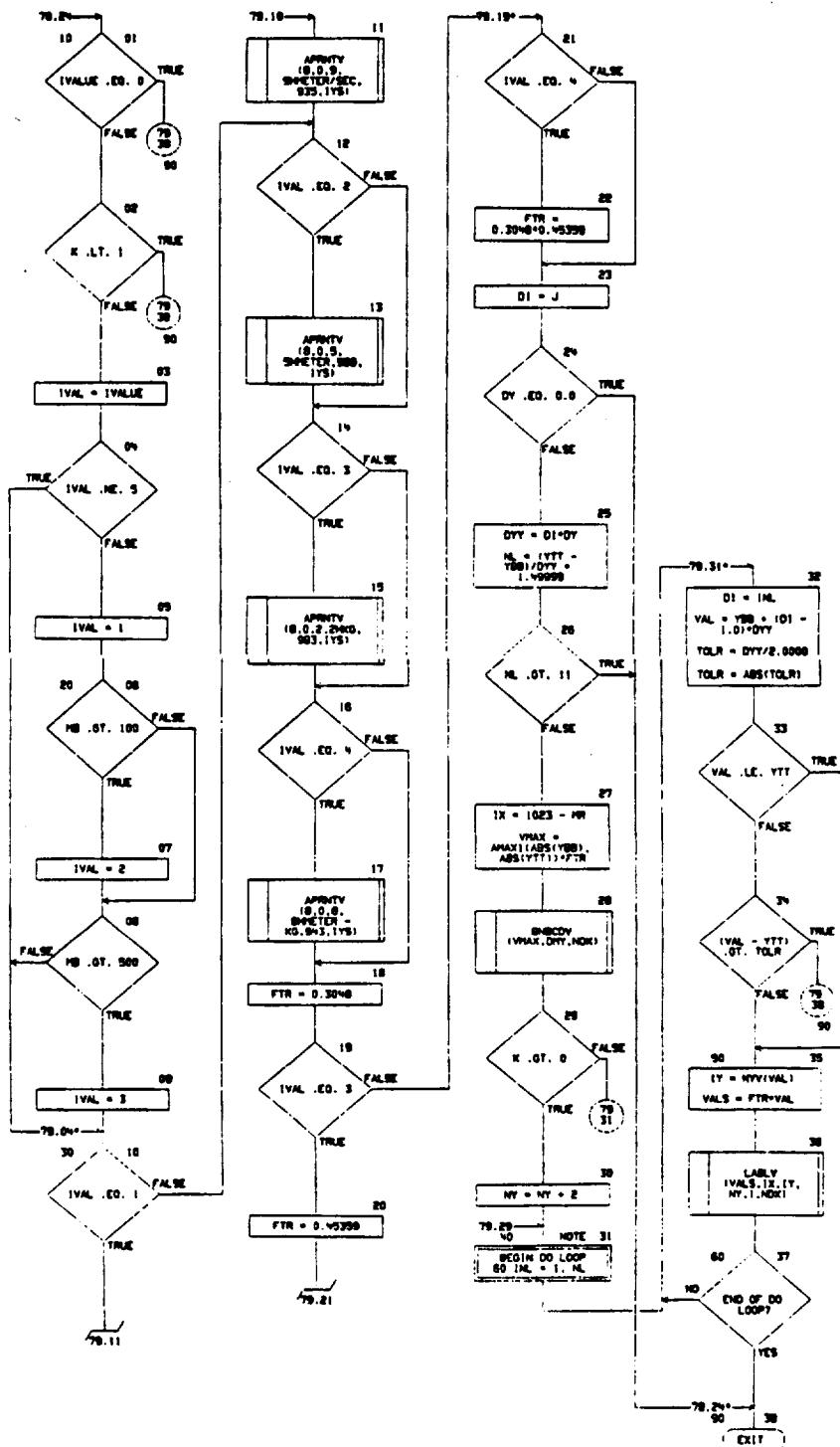


05/22/79

AUTOMATION CHART SET - RPDD.FLO RPDD-FLOW

PAGE 79

CHART TITLE - SUBROUTINE GRIDIN(IL,IR,IY,IYB,IL,IR,YB,YT)



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09/22/79

AUTOPOLY CHART SET - MFD0,FL0 MFD0-FLOW

PAGE 80

CHART TITLE - NON-PROCEDURAL STATEMENTS

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REAL = 0 DRY  
COMMON /SPECS/ (IV150)  
EQUIVALENCE (IV117), (ML), (IV118), (ML), (IV119), (ML), (IV120), (ML)  
COMMON /CDS/ IV VALUE

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09/22/74

CHART TITLE - NON-PROCEDURAL STATEMENTS

AIRPORT CHART SET - NFOO.FLO FFFD-FLO

PAGE 22

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DIMENSION SEC(1)





09/22/74

CHART TITLE - NON-PROCEDURAL STATEMENTS

AW - CHART SET - INFO.FLO INFO-FLOC

PAGE 84

DIMENSION BCD(11)



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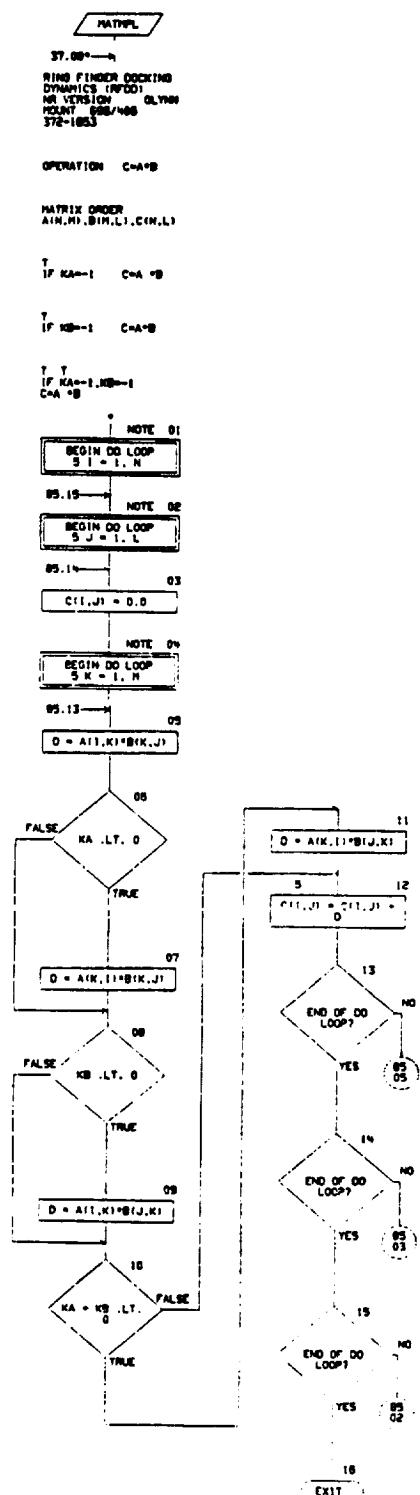


03/22/74

AUTOMATION CHART SET - RFDL.FLO RFDL-FLOW

PAGE 05

CHART TITLE - SUBROUTINE MATRIX(A,N,M,B,L,C,K,I,J)



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SD 74-CS-0023

NUMBER 2





05/22/74

CHART TITLE - NON-PROCEDURAL STATEMENTS

ANNUAL CHART SET - AFDD-FLO AFDD-FLO

PAGE 88

DIMENSION A(M,M), B(M,L), C(N,L)

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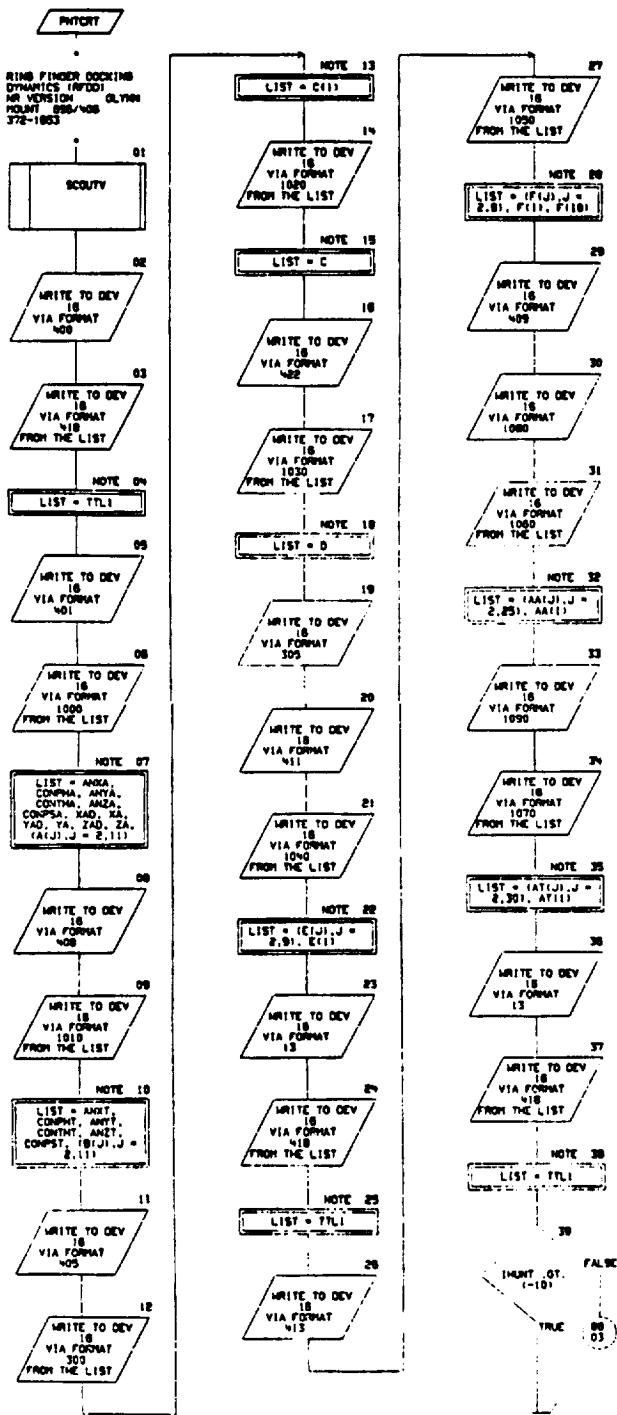
- 297 -

SD 74-CS-0023





**CHART TITLE - SUBROUTINE PATTERN**





FOLIO PAGE 1

05/22/79

AUTM ON CHART SET - RPD.FLO RPD-FLOW

PAGE 00

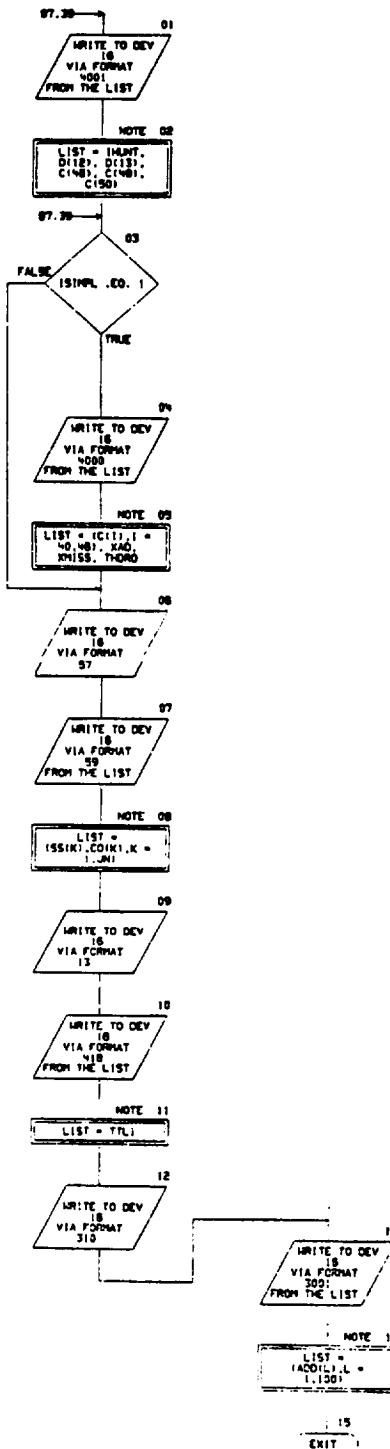
CHART TITLE - SUBROUTINE PNTORT

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SD 74-CS-0023

FOLIO PAGE 2





09/22/74 AUT - ON CHART SET - AFDD.FLO AFDD-FLO  
CHART TITLE - NON-PROCEDURAL STATEMENTS

Page

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DIMENSION VARI(600),T(2000),A(19),B(19),C(50),D(30),E(19),F(10),
          A(129),AT(30),CO(10),SS(10)

COMMON VAR

EQUIVALENCE T((1),XAI),(12),YAI,(13),ZAI,
              (14),LNUMT,(15),LNUPL,
              (16),LNUD,(17),YAD,(18),ZAD,
              (19),JDU,(20),JDRD,(21),JR(195)

EQUIVALENCE VARI(1),A(11),(VARI(1),B(1)),(VARI(1),C(11)),
              (VARI(1),D(11),(VARI(1),E(11),(VARI(1),F(11),
              (VARI(1),G(11),(VARI(1),H(11),(VARI(1),I(11),
              (VARI(1),J(11),(VARI(1),K(11),(VARI(1),L(11),
              (VARI(1),M(11),(VARI(1),N(11),(VARI(1),O(11),
              (VARI(1),P(11),(VARI(1),Q(11),(VARI(1),R(11))

COMMON/ADONC/ADD(100)
REAL*16 TFL,TITLE
COMMON/TITLE/ TFL(1),TFL(2)
COMMON/DEUTY/ ANIA,ANIA,ANZA,COPMA,CONTHA,COPSA,
              ANHT,ANHT,ANZT,COMPT,CONTNT,COMPST

FORMAT(1I1)
97 FORMAT(5X,' STROKE VS AREA TABLES ' // )
98 FORMAT(7HE19.8,5X,E19.8)
300 FORMAT(5X,' * NO ATTENATORS * ',13, // )
305 FORMAT(5X,' //')
310 FORMAT(5DX,10*' *** ADD = ARRAY *** ', // )
400 FORMAT(5H1H, //,50X,3H*** INITIAL CONDITIONS *** , // )
401 FORMAT(5DX,19H ACTIVE VEHICLE//)
403 FORMAT(5DX,19H C-ARRAY/ ATTENUATOR DATA // )
408 FORMAT(5DX,19H TARGET VEHICLE//)
409 FORMAT(5H2X,24H REACTION CONTROL SYSTEM//)
411 FORMAT(50X,17H PROGRAM COMMANDS//)
413 FORMAT(50X,17H INTEGRATION DATA//)
416 FORMAT(50X,14H CASE NO.548//)
422 FORMAT(5X, //,50X, ' D = ARRAY ' // )
1000 FORMAT(7XNAME1E16.8,7XNAME2E16.8,7XNAME3E16.8,7XNAME4E16.8,
        7XNAME5E16.8,7XNAME6E16.8,7XNAME7E16.8,7XNAME8E16.8,
        7XNAME9E16.8,7XNAME10E16.8,7XNAME11E16.8,7XNAME12E16.8,
        7XNAME13E16.8,7XNAME14E16.8,7XNAME15E16.8,7XNAME16E16.8,
        7XNAME17E16.8,7XNAME18E16.8,7XNAME19E16.8,7XNAME20E16.8,
        7XNAME21E16.8,7XNAME22E16.8,7XNAME23E16.8,7XNAME24E16.8,
        7XNAME25E16.8,7XNAME26E16.8,7XNAME27E16.8,7XNAME28E16.8,
        7XNAME29E16.8,7XNAME30E16.8,7XNAME31E16.8,7XNAME32E16.8,
        7XNAME33E16.8,7XNAME34E16.8,7XNAME35E16.8,7XNAME36E16.8,
        7XNAME37E16.8,7XNAME38E16.8,7XNAME39E16.8,7XNAME40E16.8,
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## **CHART TITLE - NON-PROCEDURAL STATEMENTS**

The logo consists of a stylized black and white graphic of a vertical rocket ship with a pointed nose cone and a circular base, positioned to the left of the company name.

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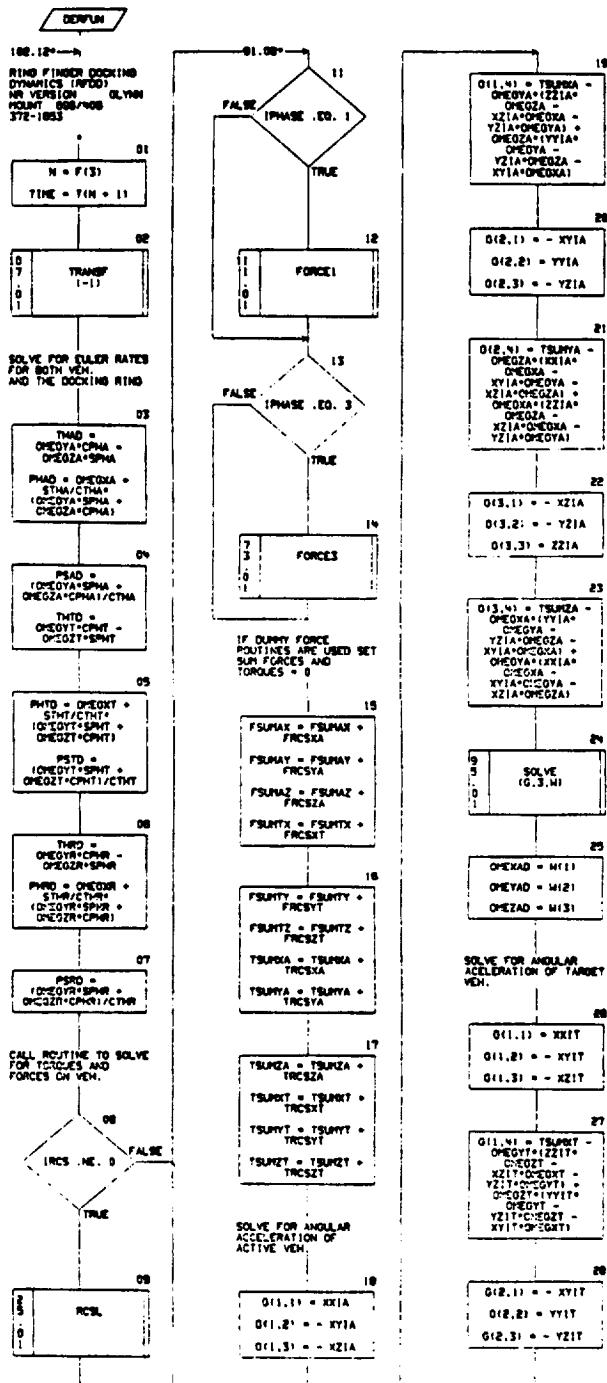
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**AUTOFLOW CHART SET - AF00.FLO AF00-FLOW**

PAGE 91

**CHART TITLE - SUBROUTINE CDFRUN**



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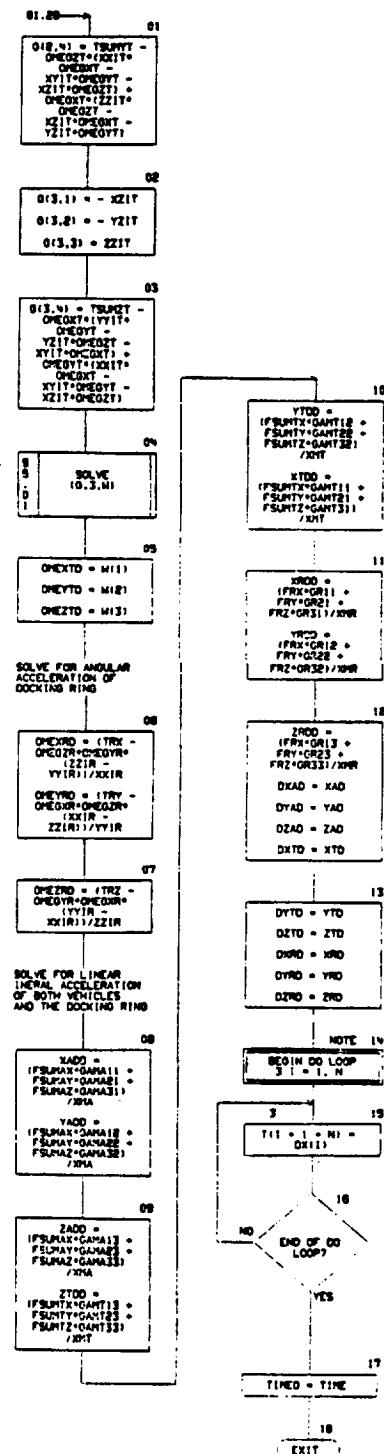
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AUTOPDN CHART SET - RFDD.FLO RFDD-FLOW

PAGE 92

CHART TITLE - SUBROUTINE DDPUN





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Divine Theology

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**CHART TITLE - NON-PROCEDURAL STATEMENTS**

AUTOM. CHART SET - RFCD.FLD RFCD-FLG

PAGE 1

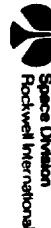




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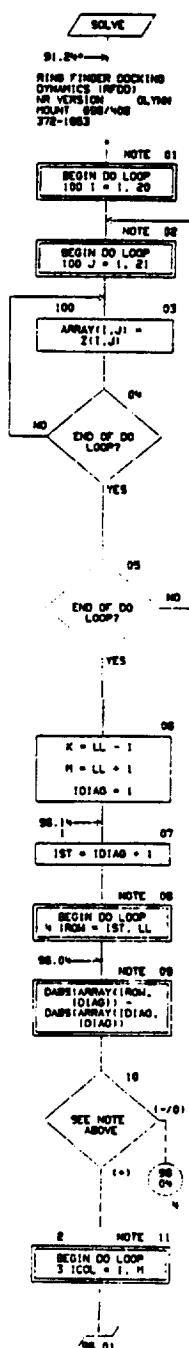


05/22/78

AUTOMATION CHART SET - AFDO.FLG AFDO-FLOW

PAGE 83

CHART TITLE - SUBROUTINE SOLVE(Z,LL,X)



Space Division  
Rockwell International

1-DOWN 1-UP

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- 315 -

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TOPDOWN PAGE 2



FOLIO/DIV 1

09/28/74  
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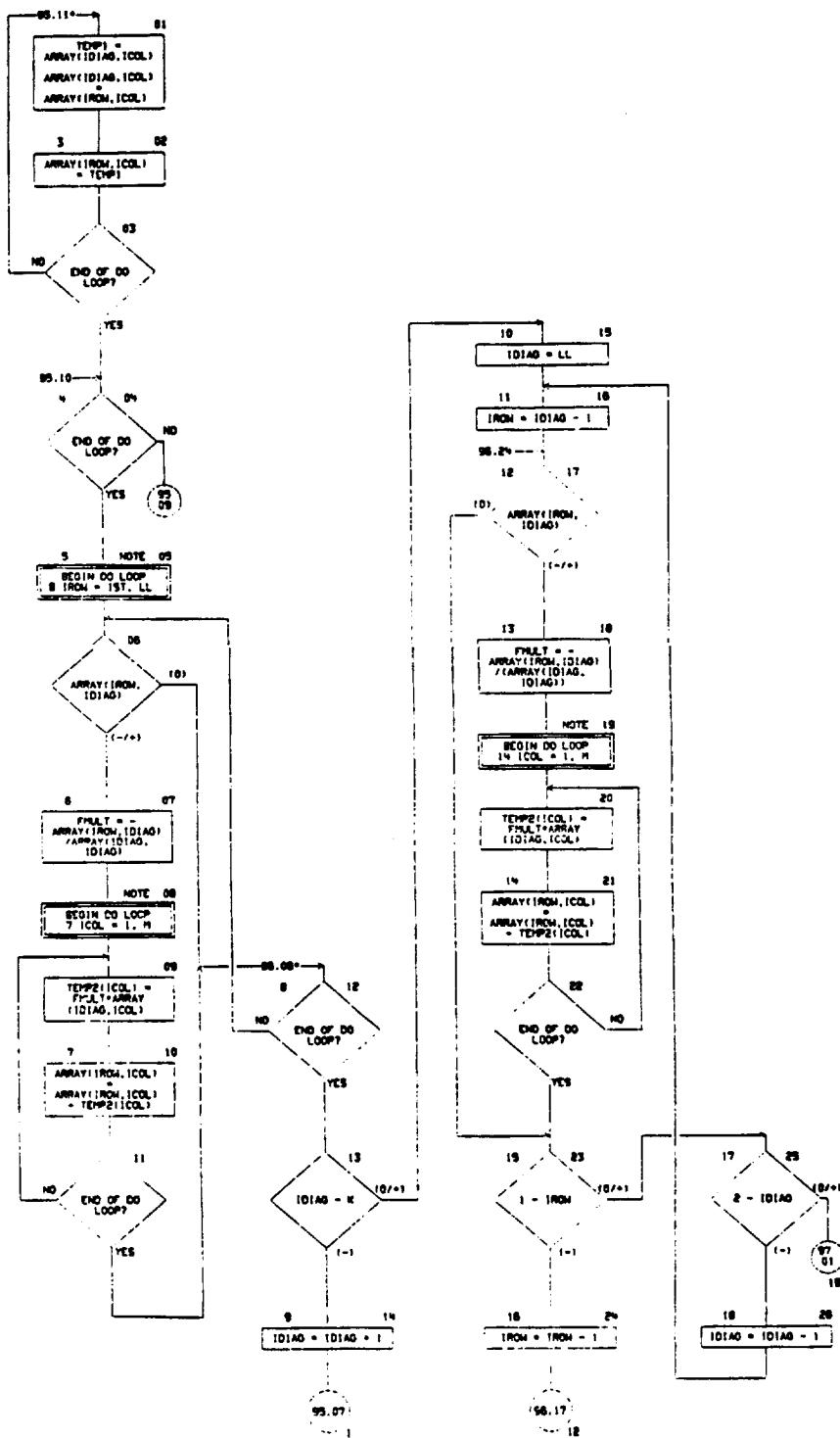
AUTOFLOW CHART SET - RFDD-FLO RFDD-FLOW

PAGE 98

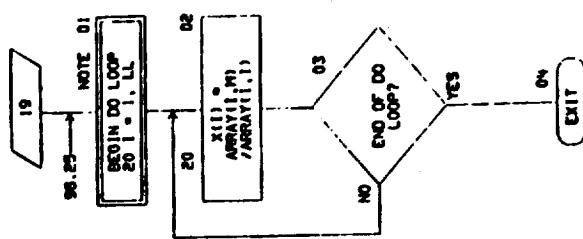
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- 317 -







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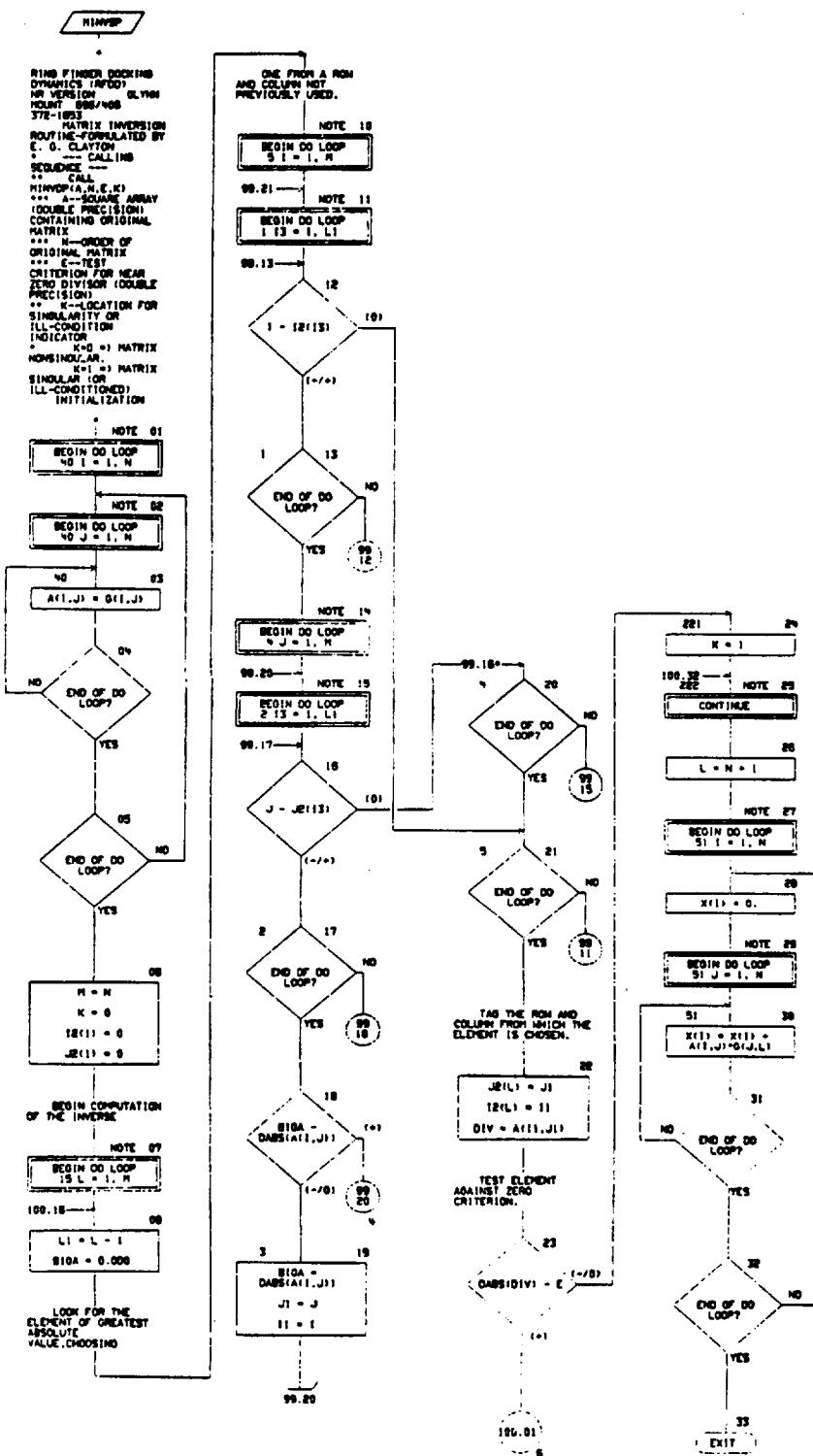


03/總八四

AUT CM CHART SET - RFDL.FLG SPEED-FLOW

Part 1

**CHART TITLE - SUBROUTINE NUMBER(1,2,3,4,5,6,7,8,9)**



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- 321 -

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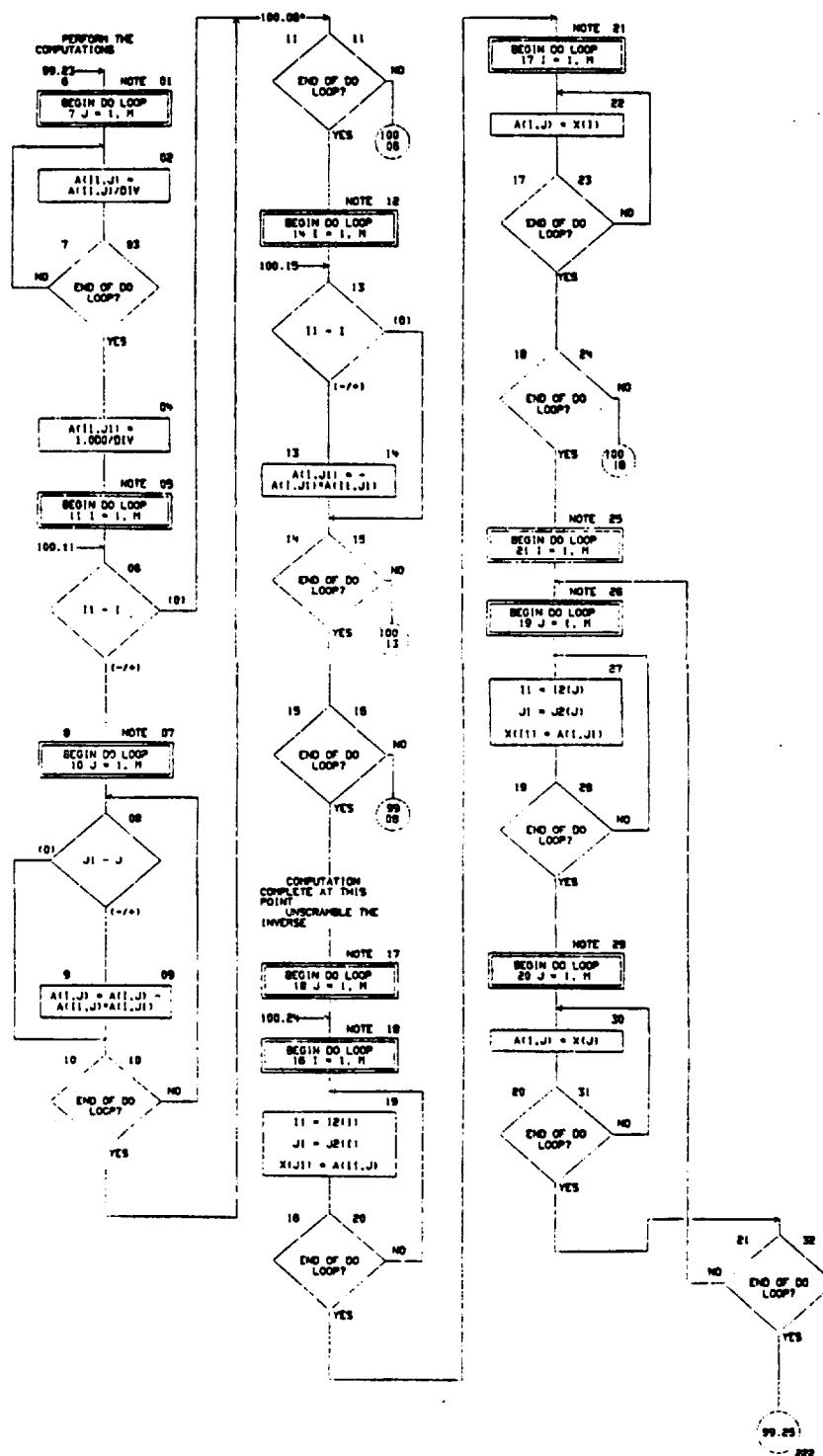
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CHART TITLE - SUBROUTINE MINISPAN.H,C,K,J,B,X,J2,J8,J0)





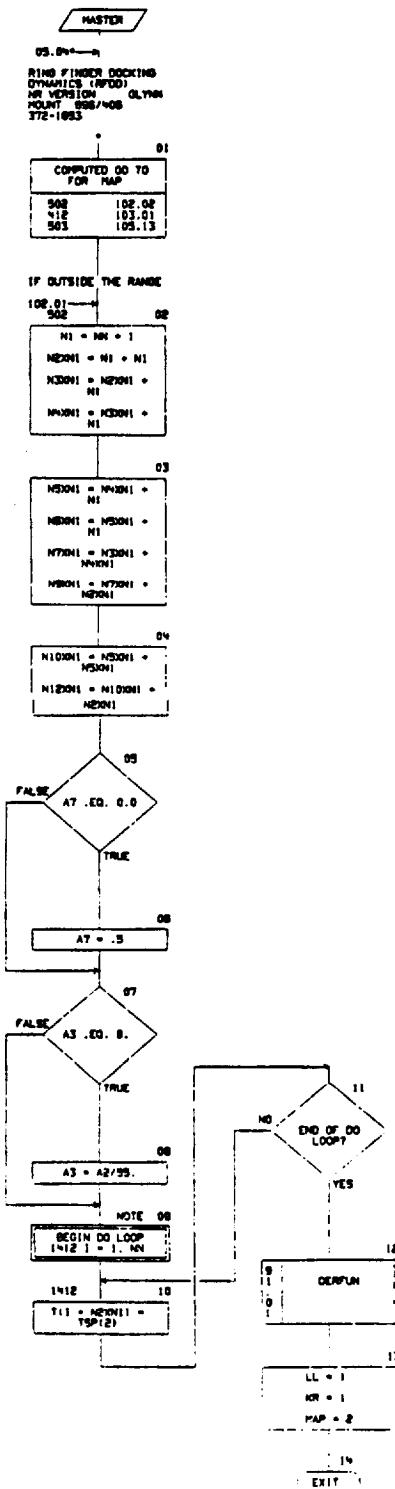
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DIMENSION A(18),B(18),X(18),Z(18),J(18)  
.0148,.991,Y(18,6)



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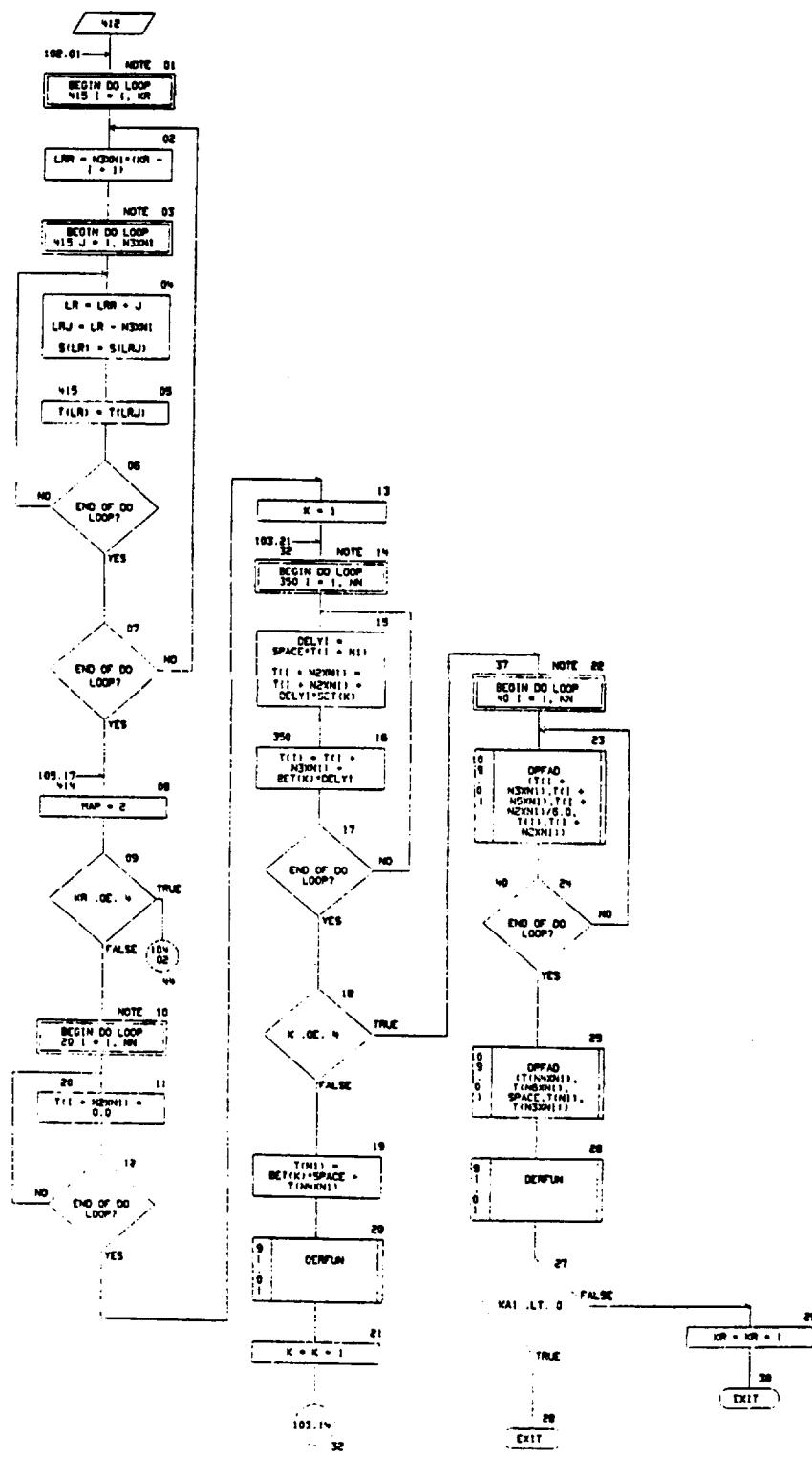


05/22/79

AUTOMATION CHART SET - AF00.FLO AF00-FL0W

PAGE 103

## CHART TITLE - SUBROUTINE MASTER



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- 329 -

SD 74-CS-0023



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- 331 -

SD 74-CS-0023

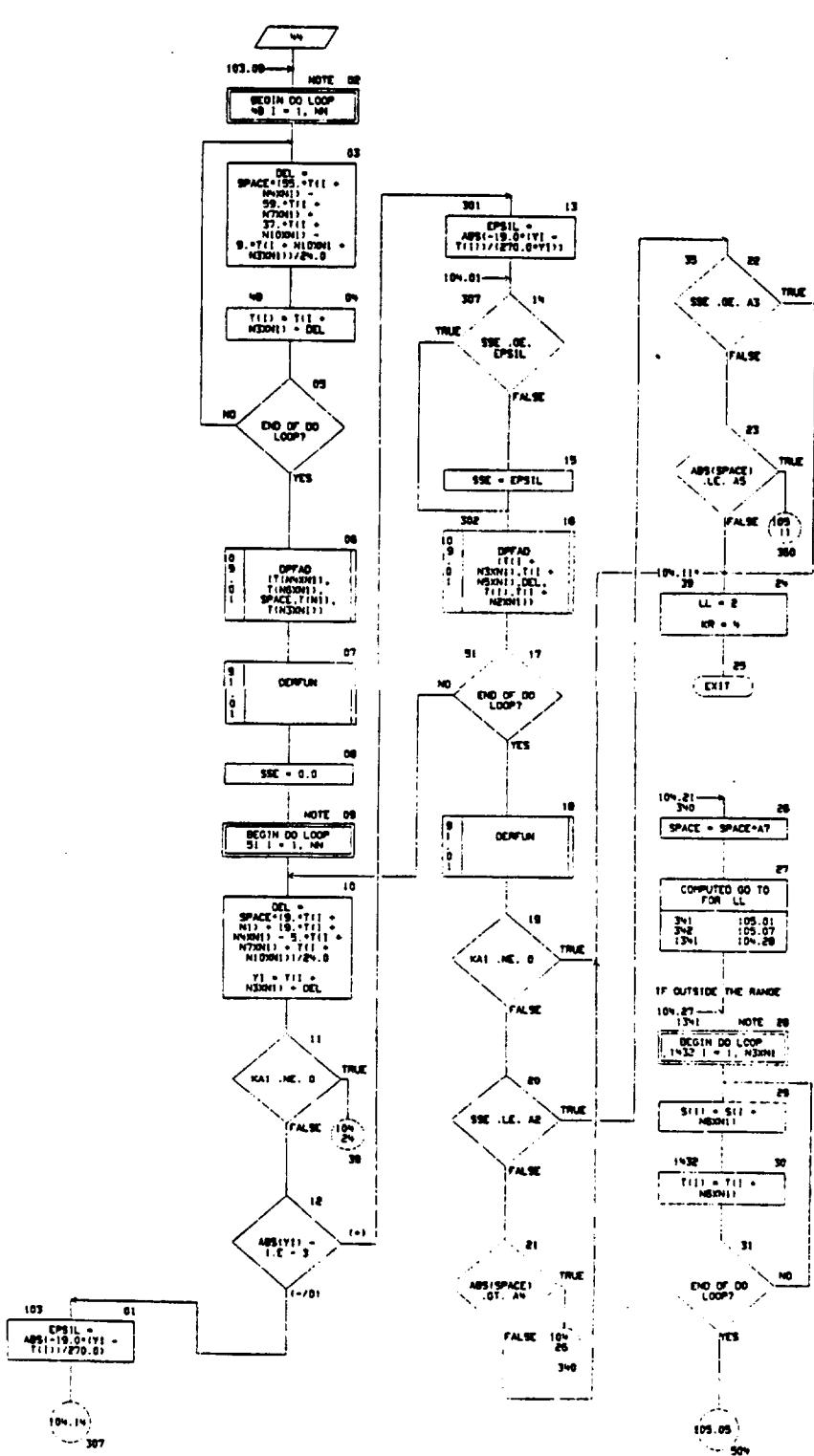
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FOLIO 1

05/22/74

AUTOMATION CHART SET - RTOD.FLO RTDD-FLOW

PAGE 104

CHART TITLE - SUBROUTINE MASTER



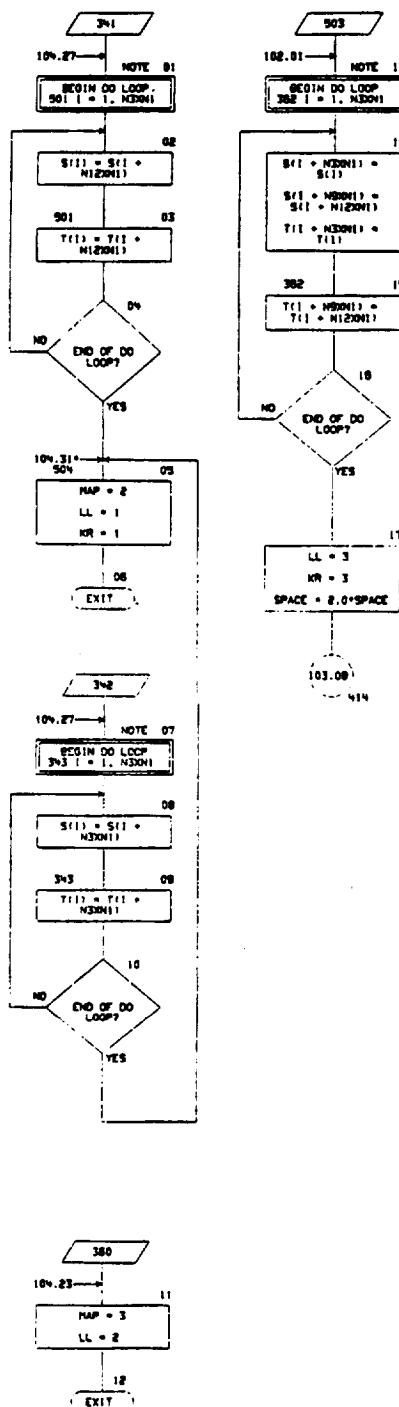


05/28/79

AUTOMATION CHART SET - RFD0.FLO RFD0-FLOW

PAGE 105

CHART TITLE - SUBROUTINE MASTER



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- 333 -

SD 74-CS-0023

FOLDOVER PAGE 2





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DIMENSION VAR(2400),T(1200),S(1200),F(10)
DIMENSION BET(16),SET(16)
DIMENSION TSP(12)
DOUBLE PRECISION TOP
EQUIVALENCE (TSP(11),TOP)
EQUIVALENCE (T(12),SPACE), (F(3),A3), (F(4),A3), (F(5),A3), (F(6),A3),
(F(7),A3), (F(8),A3), (F(9),A7)
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COMMON/PP/PP,LL
COMMON/PP1/KR,K
DATA SET(1)/1.0/,SET(12)/2.0/,SET(13)/2.0/,SET(14)/1.0/
DATA BET(1)/0.5/,BET(12)/0.5/,BET(13)/1.0/,BET(14)/0.0/
DATA TOP/0.0/
```



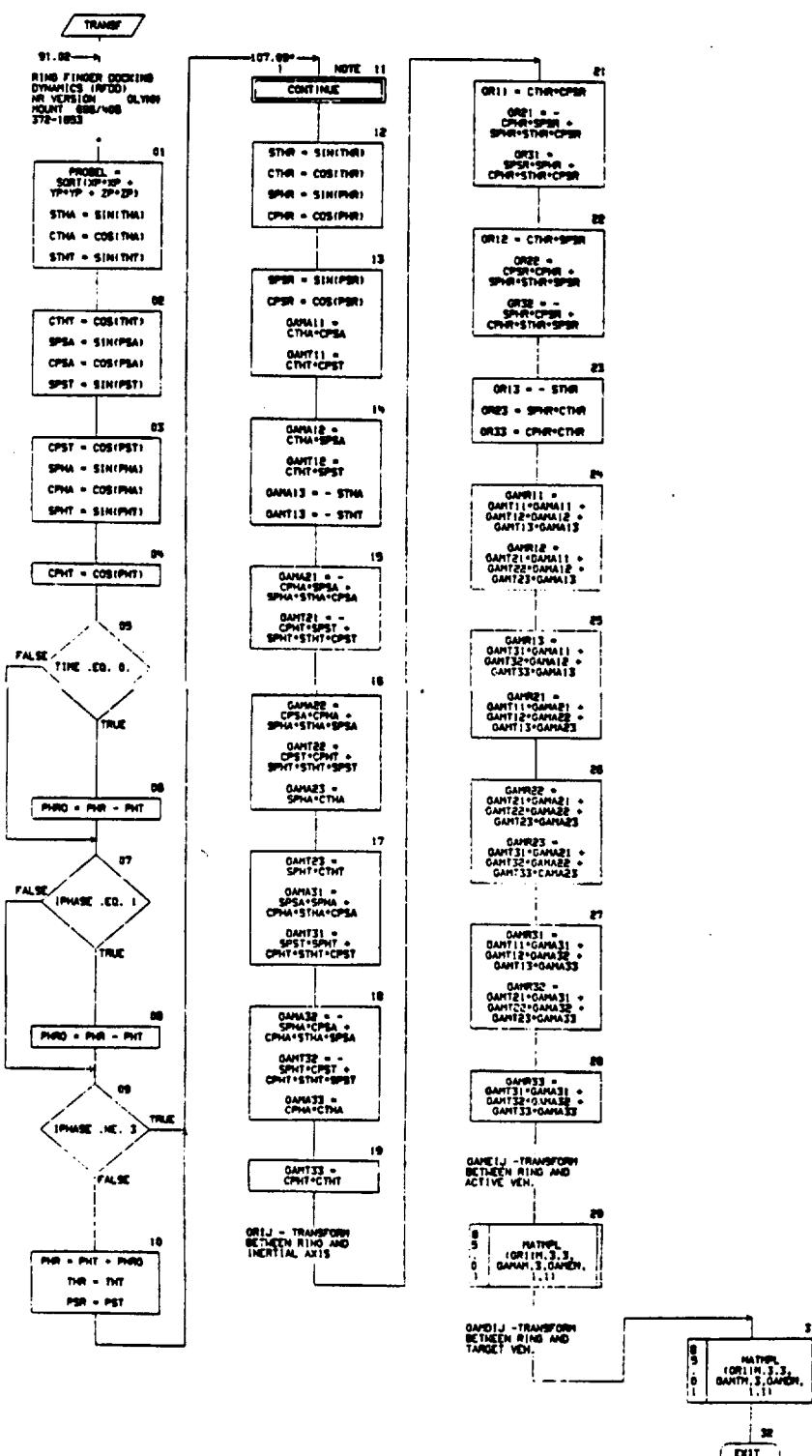
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05/22/70

AUTOMATION CHART SET - AFDO.FLO AFDO-FLOW

PAGE 187

CHART TITLE - SUBROUTINE TRANSIT(TRANS)



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DOUBLE PRECISION A1,B1,C1  
DIMENSION A(6)  
EQUIVALENCE (A(1),A1),(A(3),B1),(A(5),C1)  
DATA A1/0.0/





05/22/78

## AUTOMATION CHART SET - RFDD.FLO RFDD-FLOW

PAGE 111

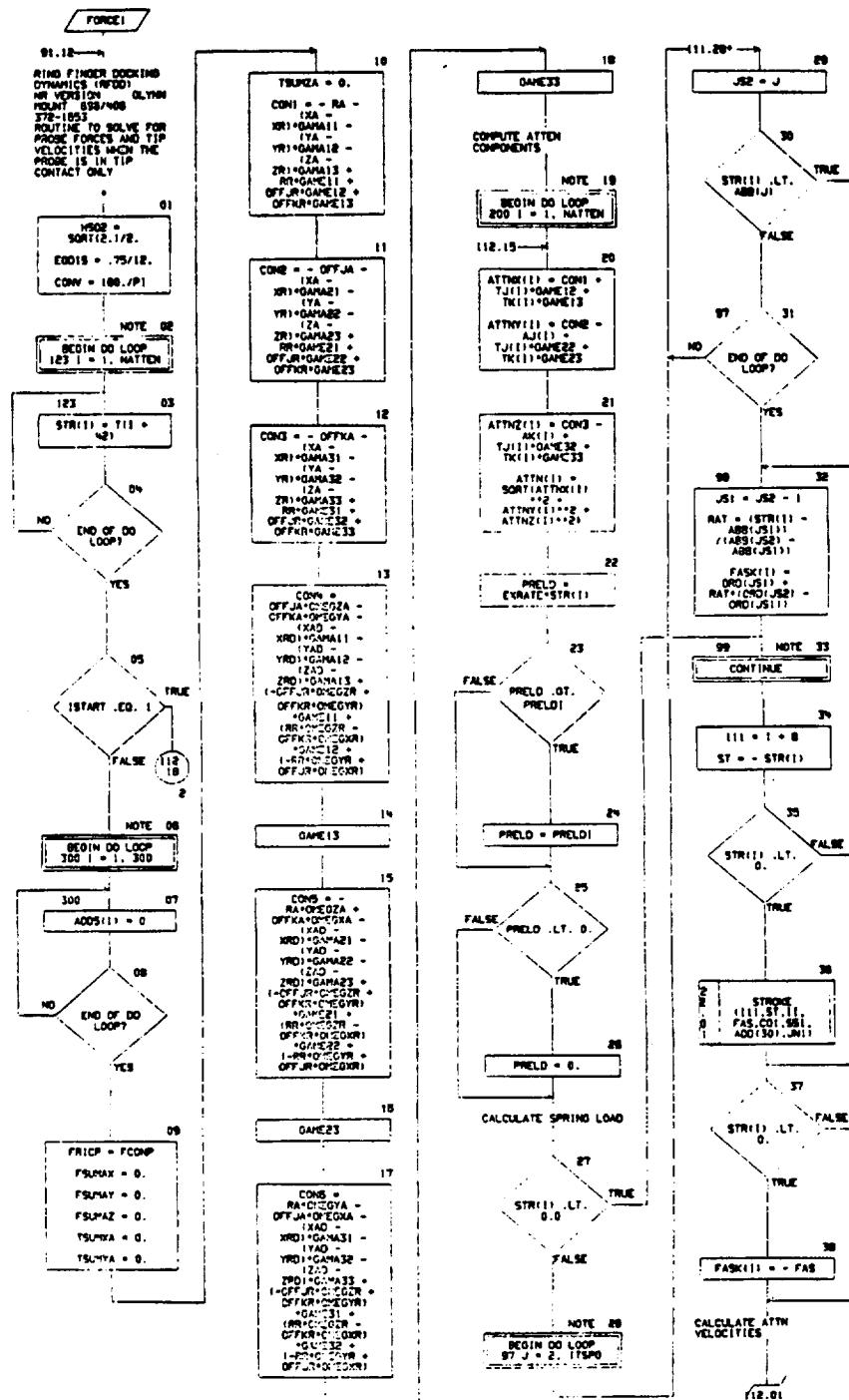
CHART TITLE - SUBROUTINE FORCE1

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05/22/74

AUTOMATION CHART SET - RFDD.FLD RFDD-FLOW

PAGE 112

CHART TITLE - SUBROUTINE FORCE1

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- 345 -

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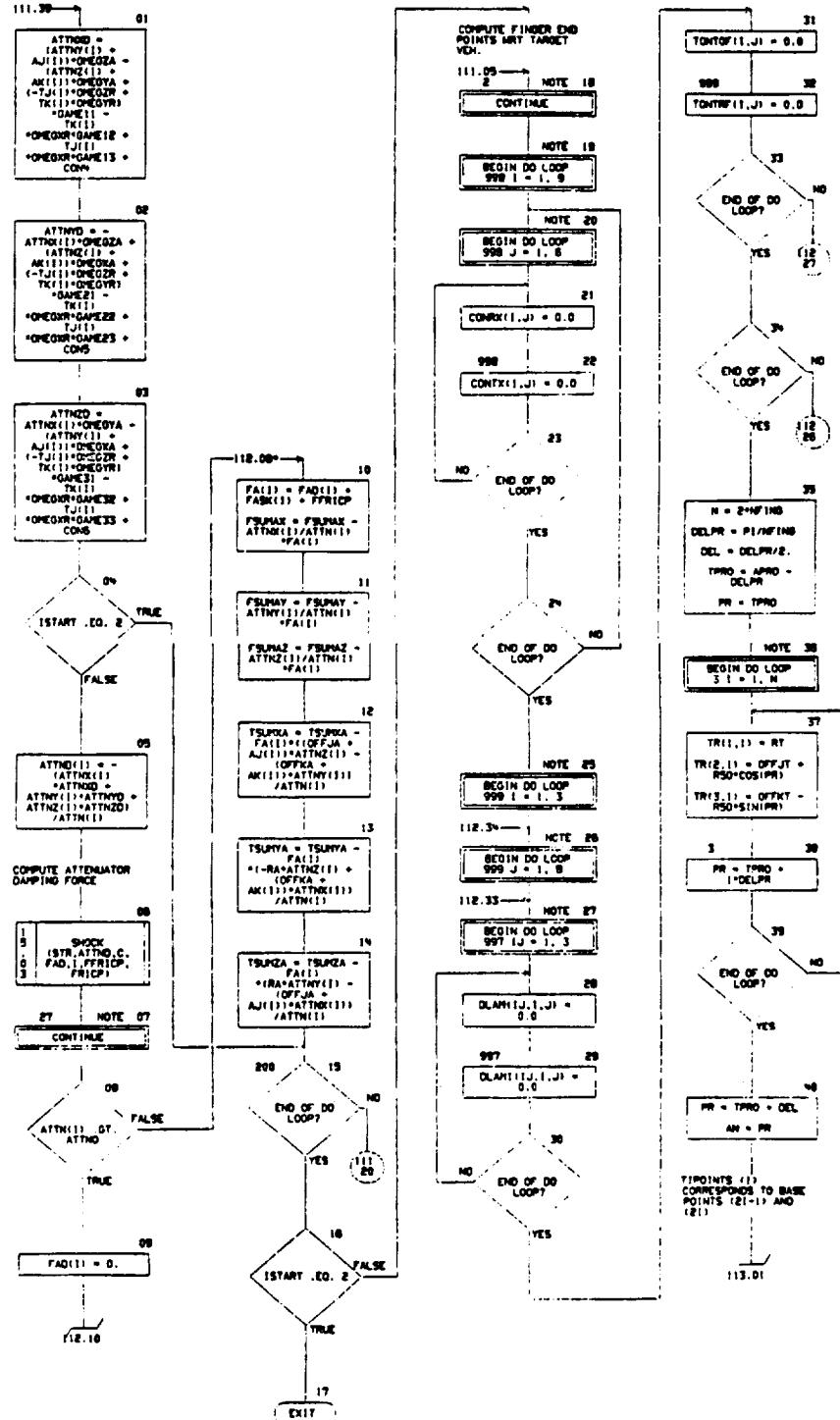
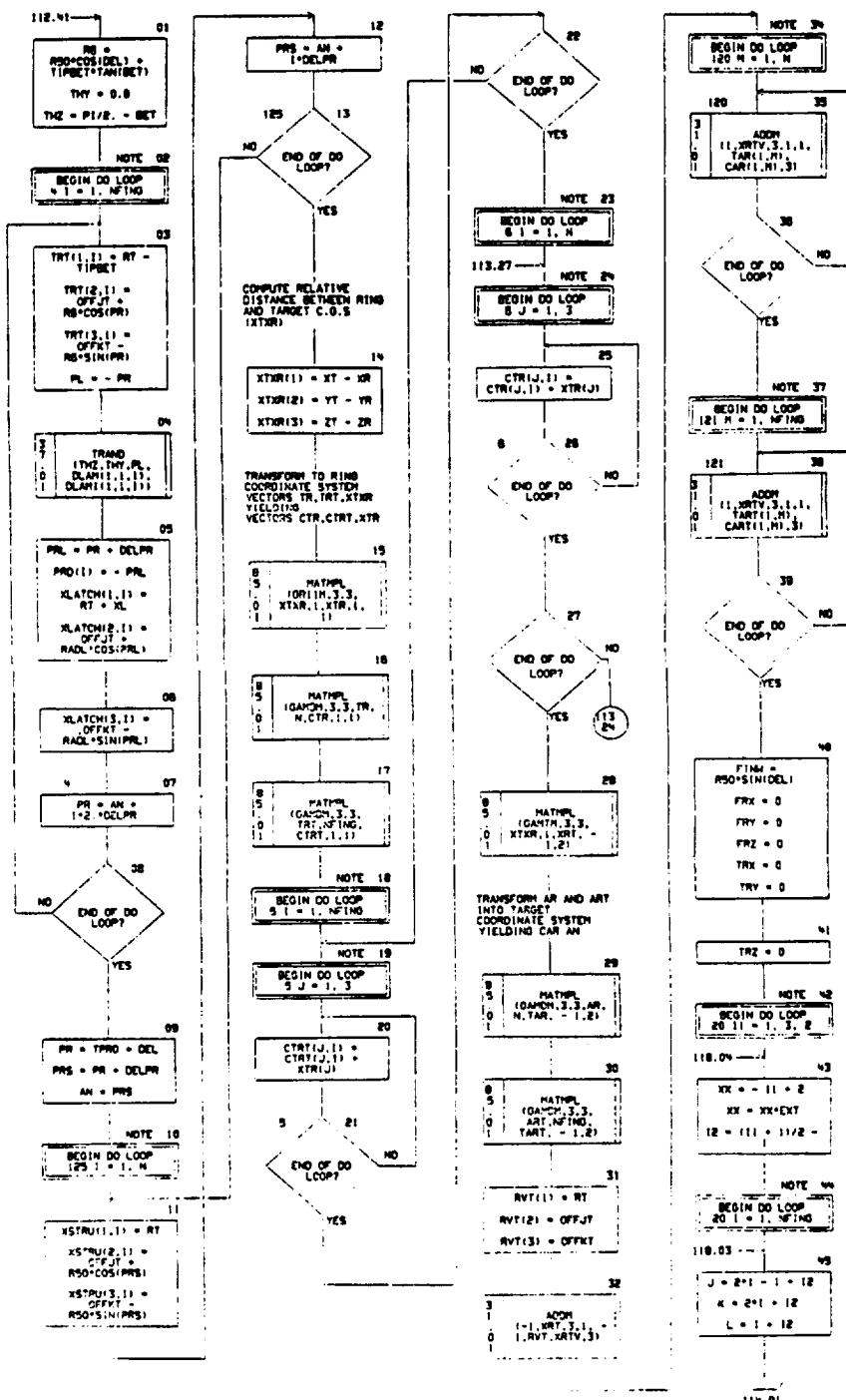




CHART TITLE - SUBROUTINE FORGE





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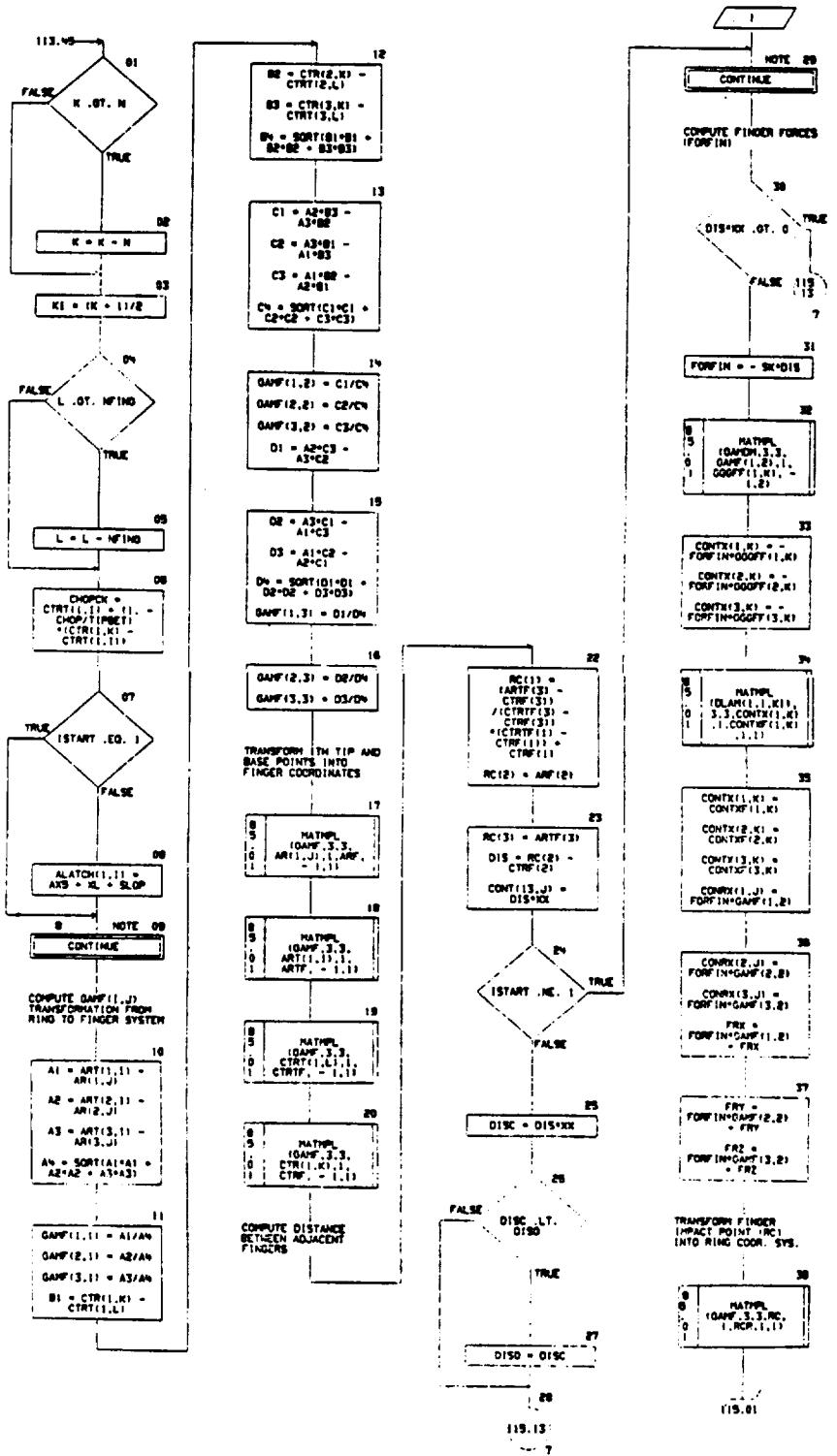
SD 74-CS-0023

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05/22/78

**AMERICAN SWEET SET - 2000 ALA MELT-A-SET**

PAGE 11



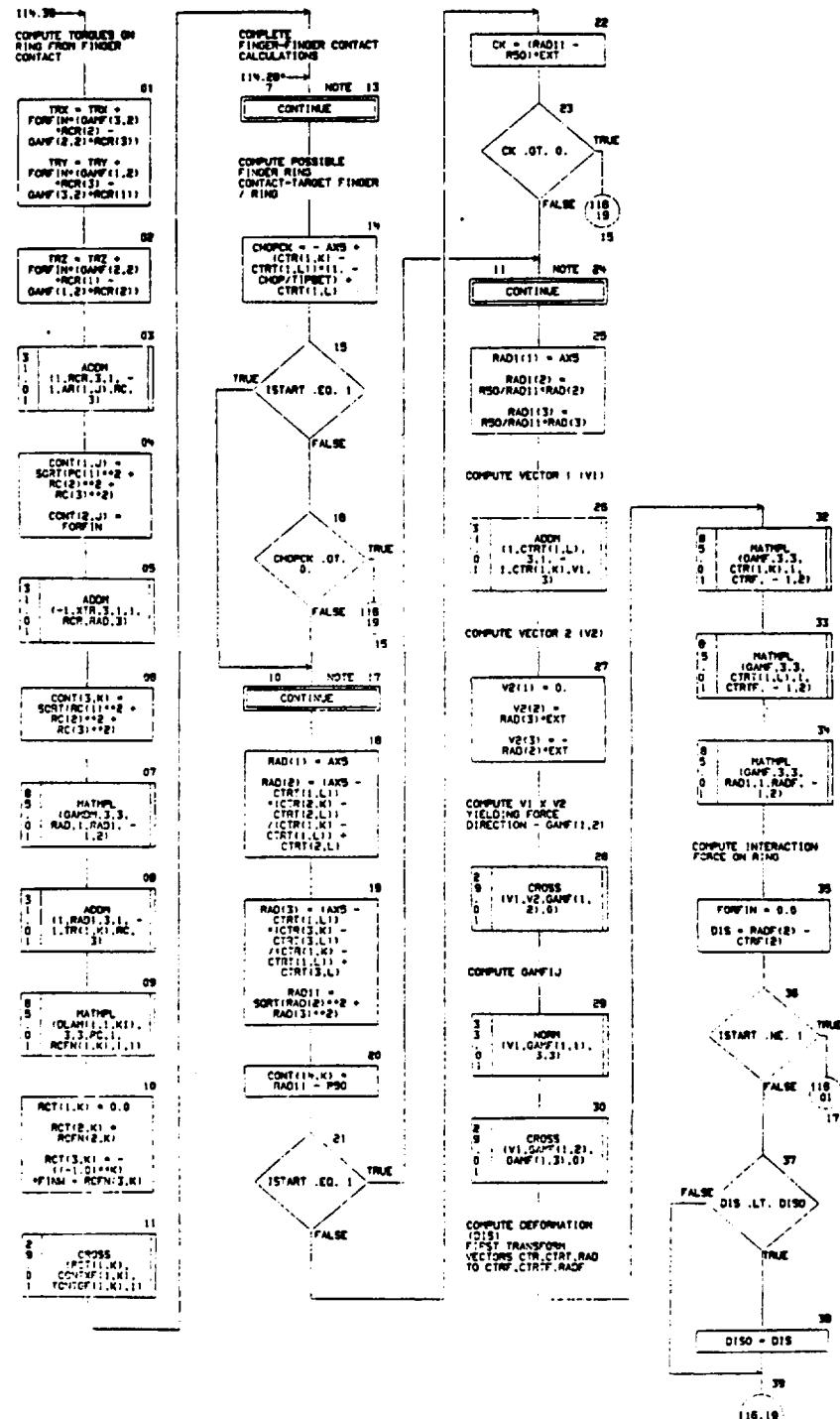


05/22/79

## AUTOFLOW CHART SET - RFDD.FLD RFDD-FLOW

PAGE 113

CHART TITLE - SUBROUTINE FORCE



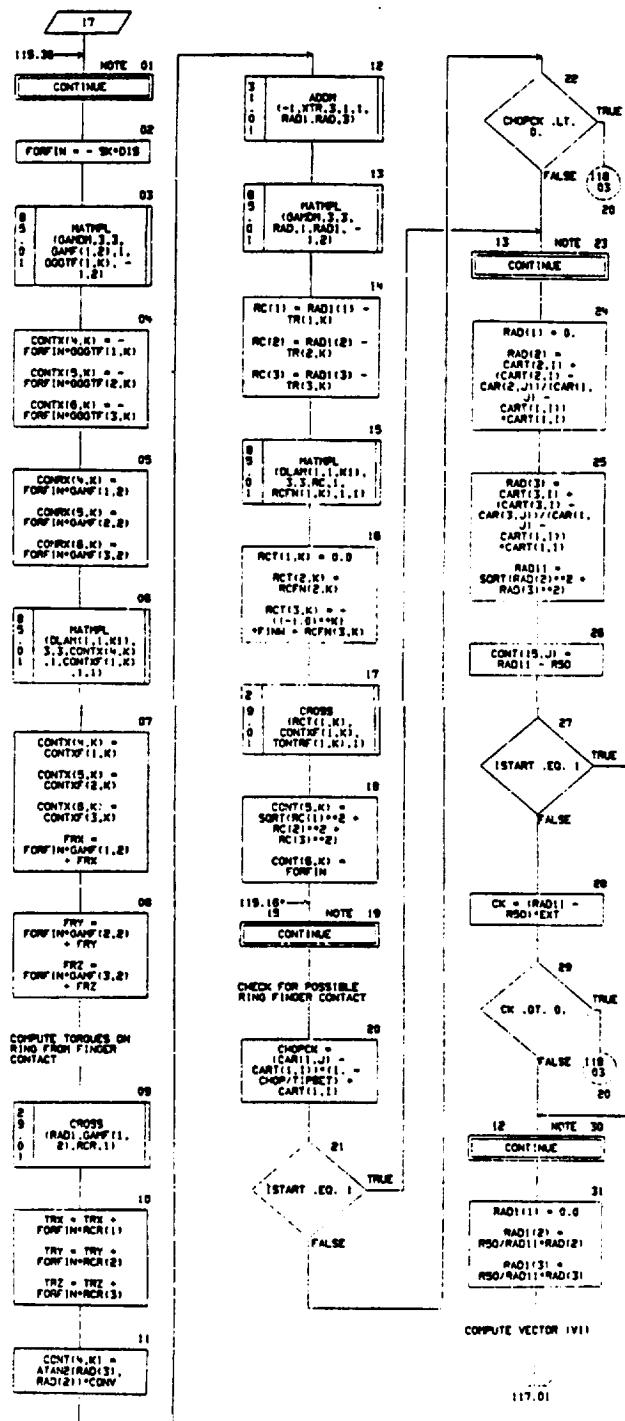


05/22/79

AUTOMATION CHART SET - RF00.FLO RF00-FLOW

PAGE 110

CHART TITLE - SUBROUTINE FORCE1

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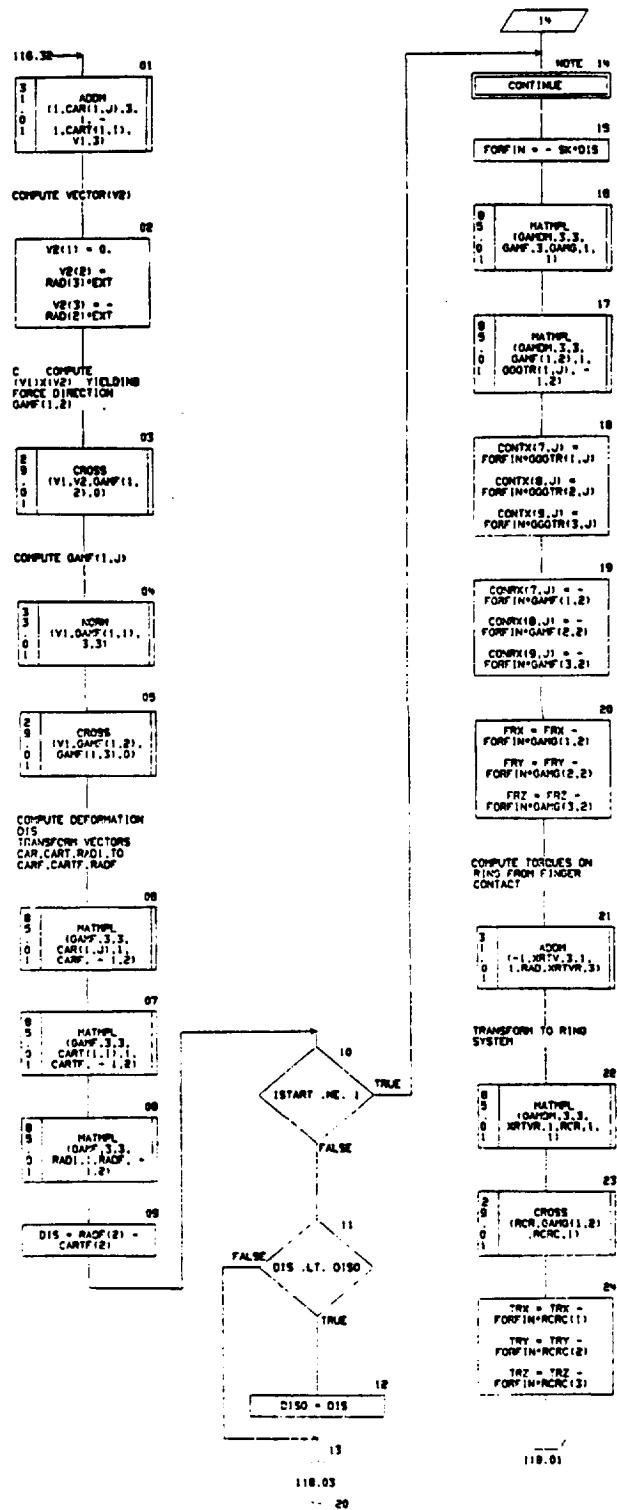
- 333 -

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SD 74-CS-0023



**CHART TITLE - SUBROUTINE FORCE!**



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SD 74-CS-0023



05/28/74

AUTOMATION CHART SET - RFDD.FLO RFDD-FLOW

PAGE 118

CHART TITLE - SUBROUTINE FORCES

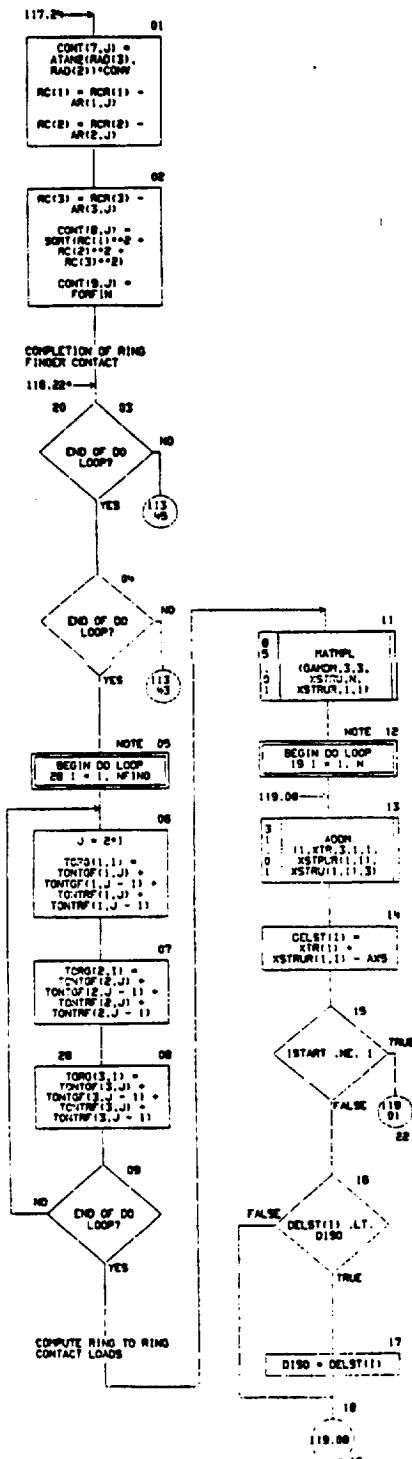
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- 357 -

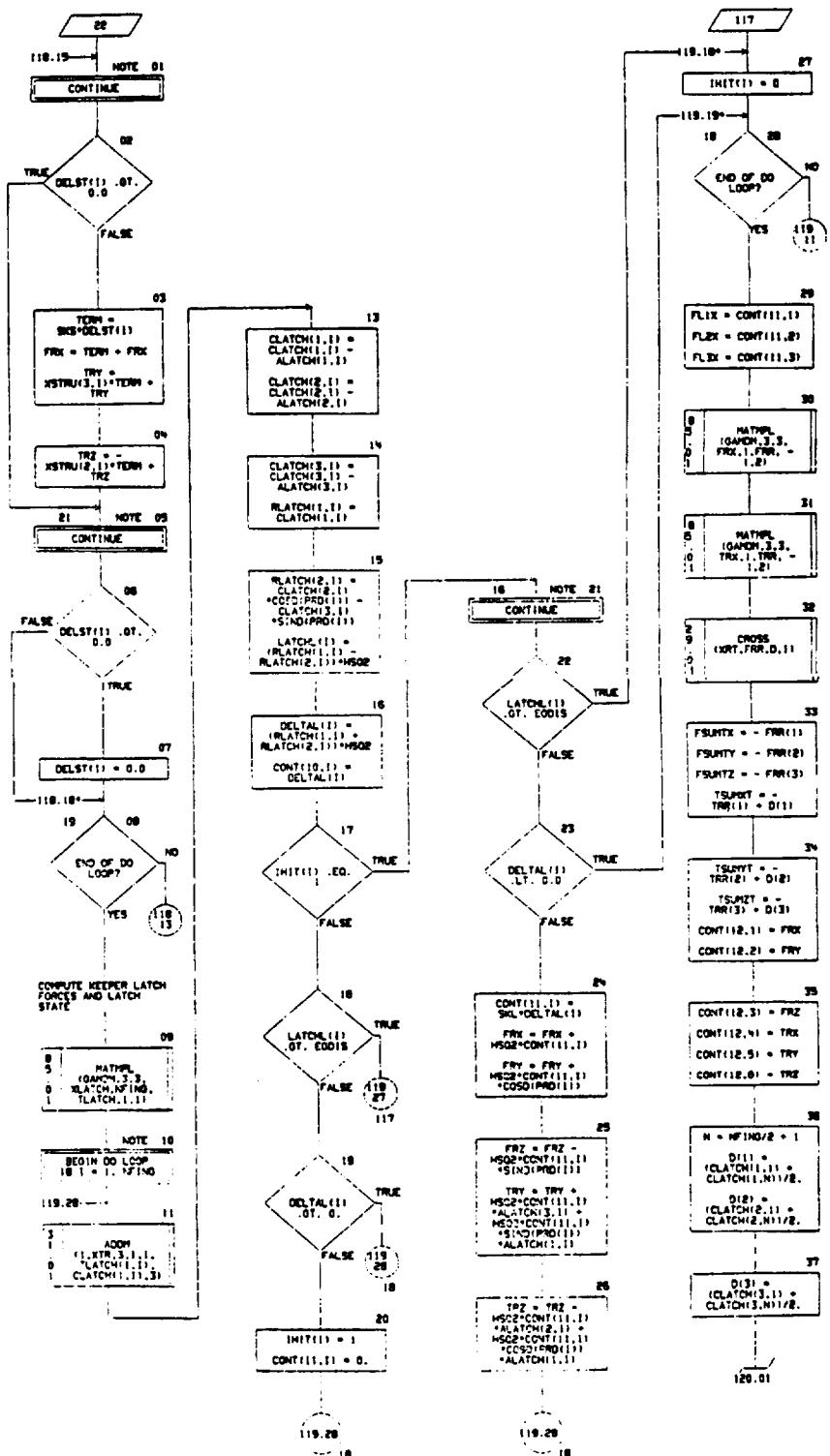
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**CHART TITLE - SUBROUTINE FORCE1**



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ROLLOUT 1

05/22/79

AUT - DM CHART SET - RPDD.FLO RPDD-FLOW

PAGE 100

CHART TITLE - SUBROUTINE FORCE1

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ROLLOUT 2

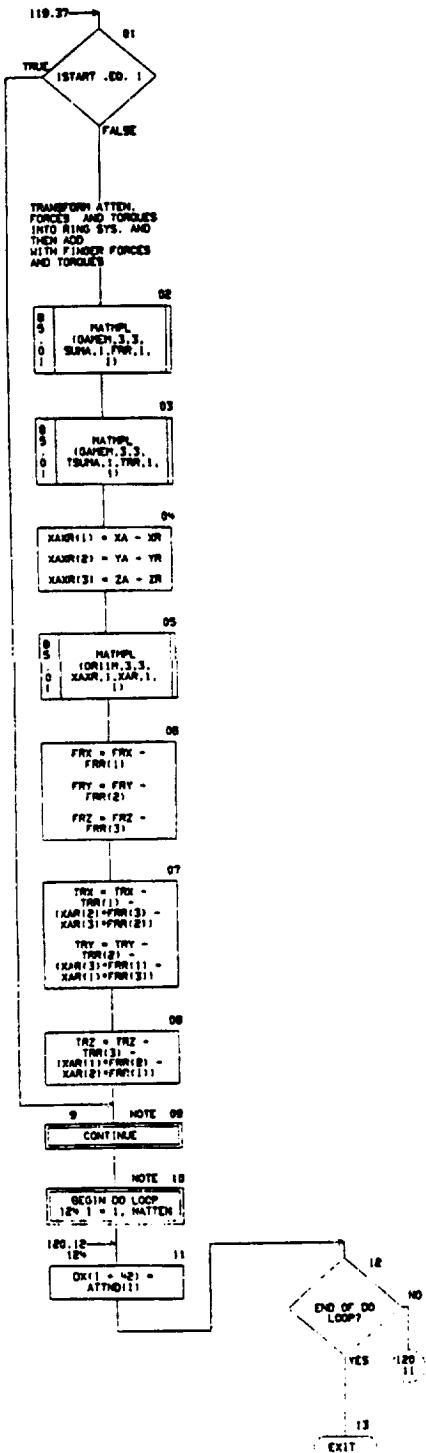




CHART TITLE - NON-PROCEDURAL STATEMENTS

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REAL*8 TYPE
DIMENSION TYPE(2)
DATA TYPE/'PDLATCH','W/LATCH 1'
DIMENSION VAR(260),T122851,A(15),B(15),C(15),D(15),E(15),F(15),
     AA(25),AT(30),CO(10),SS(10)
DIMENSION ATTM(20),ATTW(20),ATTH(20),STR(20),FAB(20)
,ATHD(20),FAD(20),FA(20),AJ(20),AX(20),TJ(20),TK(20),TH(20)
,TME(20),V1431,V2131,RADF(3),XLATCH(3,20),TLATCH(3,20)
,CLATCH(3,20),INIT(20),RAD1(3)
DIMENSION XRT(3),YRT(3),N01,TART(3,20),XRTV(3),CAR(3,40),
     CART(3,20),RAD1(3),CARF(3),CARTF(3),GARD(3,3),XRTVR(3),RCR(3)
EQUIVALENCE (ADD(50),CD0),(ADD(51),SH0),(ADD(52),AC0),(ADD(53),AC0
M),(ADD(54),R1),(ADD(55),HC0)
,(ADD(711),XL),(ADD(721),RADL)
COMMON/LATCH/XLATCH(3,4),CLATCH
EQUIVALENCE (S145),INIT(1),ADD(29),S01
DIMENSION ADD(100),CO(110),SS(10)
EQUIVALENCE (ADD(70),JN1),(ADD(81),CO(111)),(ADD(91),SS(11))
DIMENSION OR11M(3,3),GANTH(3,3),GANDM(3,3),GANDH(3,3),CTR(3,40),
     TR(3,40),TRT(3,20),CTR(3,20),ARF(3),ART(3),CTR(3),
     CTRF(3),SUMA(3),TSUMA(3),PRR(3),TRR(3),XAR(3),XAR(3),
     XTR(3),XTR(3),RCR(3),GARF(3,3),RC(3)
EQUIVALENCE (OR11M(1,1),OR11),(GANTH(1,1),GANTH(1,1)),
     GANDM(1,1),(GANDH(1,1),GANDH(1,1))
EQUIVALENCE (ADD(1),RR1),(ADD(2),OFFJR),(ADD(3),OFFTR)
,(ADD(4),XXR1),(ADD(5),XXR1),(ADD(6),YYR1),(ADD(7),ZZR1)
,(ADD(8),NP(0)),(ADD(9),APR0),(ADD(10),AZ0),(ADD(11),BET
1),(ADD(15),TPBET),(ADD(16),TPR0),(ADD(17),CHP)
,(ADD(18),SK1),(SUMA(1),TSUMA(1),TSUMA(1))
,(ADD(19),RS01),(ADD(21),AV3),(ADD(22),AV3
),(ADD(19),0150),(ADD(20),1START)
EQUIVALENCE (T111),XAI,(T121),YAI,(T131),ZAI,(T141),XTI,(T151),YTI,
     (T161),ZTI,(T171),ONEQXA,(T181),ONEQYA,(T191),ONEQZA,
     (T110),ONEQXT1,(T111),ONEQYT1,(T112),ONEQZT1,
     (T113),THAI,(T114),PHA,(T115),PSA,(T116),THT,
     (T117),PHI,(T118),PST,(T119),XP,(T120),YP,
     (T121),ZP,(T122),ZO,(T123),YD,(T124),ZO1,
     (T125),XAD,(T126),YAD,(T127),ZAD,(T128),XTD,
     (T129),YTD,(T130),ZTD)
EQUIVALENCE (T131),XR01,(T132),YR01,(T133),ZR01,(T134),XR1,(T135),
     YR1,(T136),ZR1,(T137),YR1,(T138),ZR1,(T139),XR01,(T140),
     ONEQXR1,(T141),ONEQYR1,(T142),ONEQZR1
,(DX(19),YD0),(DX(20),YD0),(DX(21),ZD0),(DX(24),ZD0)
EQUIVALENCE (A(19),OFFJA),
     (A(10),OFFKA),(A(11),RA)
EQUIVALENCE (C(129),SAM1),(C(130),RATIO)
EQUIVALENCE (B(19),OFFJT),
     (B(10),OFFKT),(B(11),RT)
EQUIVALENCE (C(11),NATTEN),(C(12),DA),(C(13),DT),(C(14),ALPHA)
,(C(15),THMA),(C(16),PREL01),(C(17),DEPRE),(C(18),BRATE)
,(C(121),A10),(C(131),B10),(C(141),C10),(C(151),ERATE),(C(161),PCOMP)
,(C(171),BOTTOM)
,(C(181),F1),(C(191),DH),(C(182),V0),(C(193),BY2),(C(201),AO)
,(F121),THES91
,(C(191),EXT1),(SLOP,C(16))
COMMON/STRV/TRT
REAL*4 LATCH
COMMON /FOLLY/LATCH(3),PRO(3)
EQUIVALENCE (E(15),ITABLE1),(E(19),JN1)
EQUIVALENCE (STOP,E(31))
DIMENSION CONT(15,20)
EQUIVALENCE (AC5(11),CONT(1,1))
EQUIVALENCE (S135),HDC01,(S130),K1,(S137),VEL

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05/02/79 AUTOMATION CHART SET - RTD.FLG RTD-FLG

PAGE 10

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EQUIVALENCE (VAR(11),AT(11)),(VAR(18),C(11)),(VAR(31),C(11)),
(VAR(81),D(11)),(VAR(111),E(11)),(VAR(181),F(11)),
(VAR(139),AA(11)),(VAR(181),AT(11)),(VAR(191),CC(11)),
(VAR(180),BB(11)),(VAR(211),TT(11))

COMMON/PLEX/TIME,OK(150),ACCS(1000)

COMMON VAR

COMMON/DV1/EW,COM1,COM2,COM3,CTR,CTRT

COMMON/OUTH/SAIR,RVT,XTR

COMMON/ATTACH/AJ,AK,TJ,TK,FA,ATTNO,STR,ATM,THI,THE,ATTNO
,ATTNE,ATTY,ATTZ

COMMON/TRANS/ GAMP11,GAMP12,GAMP13,GAMP21,GAMP22,GAMP23,GAMP31,
GAMP32,GAMP33,GAMP111,GAMP121,GAMP131,GAMP211,GAMP221,GAMP231,GAMP311,
GAMP321,GAMP331,GAMP112,GAMP122,GAMP132,GAMP212,GAMP222,GAMP232,GAMP312,
GAMP322,GAMP332,GAMP113,GAMP123,GAMP133,GAMP213,GAMP223,GAMP233,GAMP313,
GAMP323,GAMP333,DAMP11,DAMP12,DAMP13,DAMP21,DAMP22,DAMP23,DAMP31,
DAMP32,DAMP33,DAMP111,DAMP121,DAMP131,DAMP211,DAMP221,DAMP231,DAMP311,
DAMP321,DAMP331,DAMP112,DAMP122,DAMP132,DAMP212,DAMP222,DAMP232,DAMP312,
DAMP322,DAMP332,DAMP113,DAMP123,DAMP133,DAMP213,DAMP223,DAMP233,DAMP313,
DAMP323,DAMP333

COMMON/INITIAL/ARW1,TINPP1,IPULL,JTEST,V,SLOPE
,PROBEA,TLSA,TL11,TKAL,TSHM1,CONST

COMMON/CALCU/P0,PC,P1,TOR1,FBI,FRE,FSC,FCR1,FCRE,FCRS,ETA1,
ETA2,ETA3,FR11A,FR12A,FR13A,TLS1,TLS2,TLS3,FR11B,FR12B,FR13B,
VELB1,VELB2,VELB3,VELP,FRCP,FCR1,FRCE,FCRS,PROBL

COMMON/FCR/FSUM1,FSUM2,FSUM3,TSUM1A,TSUM2A,TSUM3A,TSUM1,
TSUM2,TSUM3,TSUM4,TSUM5,TSUM6

COMMON/ADONDI/AD00

COMMON /ADOF/ ALF(50)

DIMENSION ABB(10),ORD(10),SS2(10),COR(10)

EQUIVALENCE (ALF(11),ABB(1)),(ALF(111),ORD(1)),
(ALF(111),SS2(1)),(ALF(311),COR(1)),

      TALF(111),TIP301,(ALF(482),JNE)

COMMON/FORC/PRX,PRY,PRZ,TRX,TRY,TRZ

COMMON/TRANS/DR11,DR21,DR31,DR22,DR32,DR13,DR23,DR33

COMMON/RECAL/S12889

COMMON/FINAR13,WOT,ART(13,20)

COMMON /PROF/ CDTX(8,8),CDRX(8,8),IPRC
,DELSLT(10)

DIMENSION RLATCH(2,3),DELTAL(3)
DIMENSION XSTRU(3,10),XSTRU(3,10)
EQUIVALENCE (S0C,C(9))
DIMENSION D008TF(3,8),D008TR(3,8),D008TR(3,8)
DIMENSION DLAM(3,3,8),DLAM(3,3,8),CDTR(3,8),RCPM(3,8),
RCT(3,8),TONTDF(3,8),TONTTF(3,8)

COMMON /PPK/ TORQ(3,8)

DATA PI/ZN38377/

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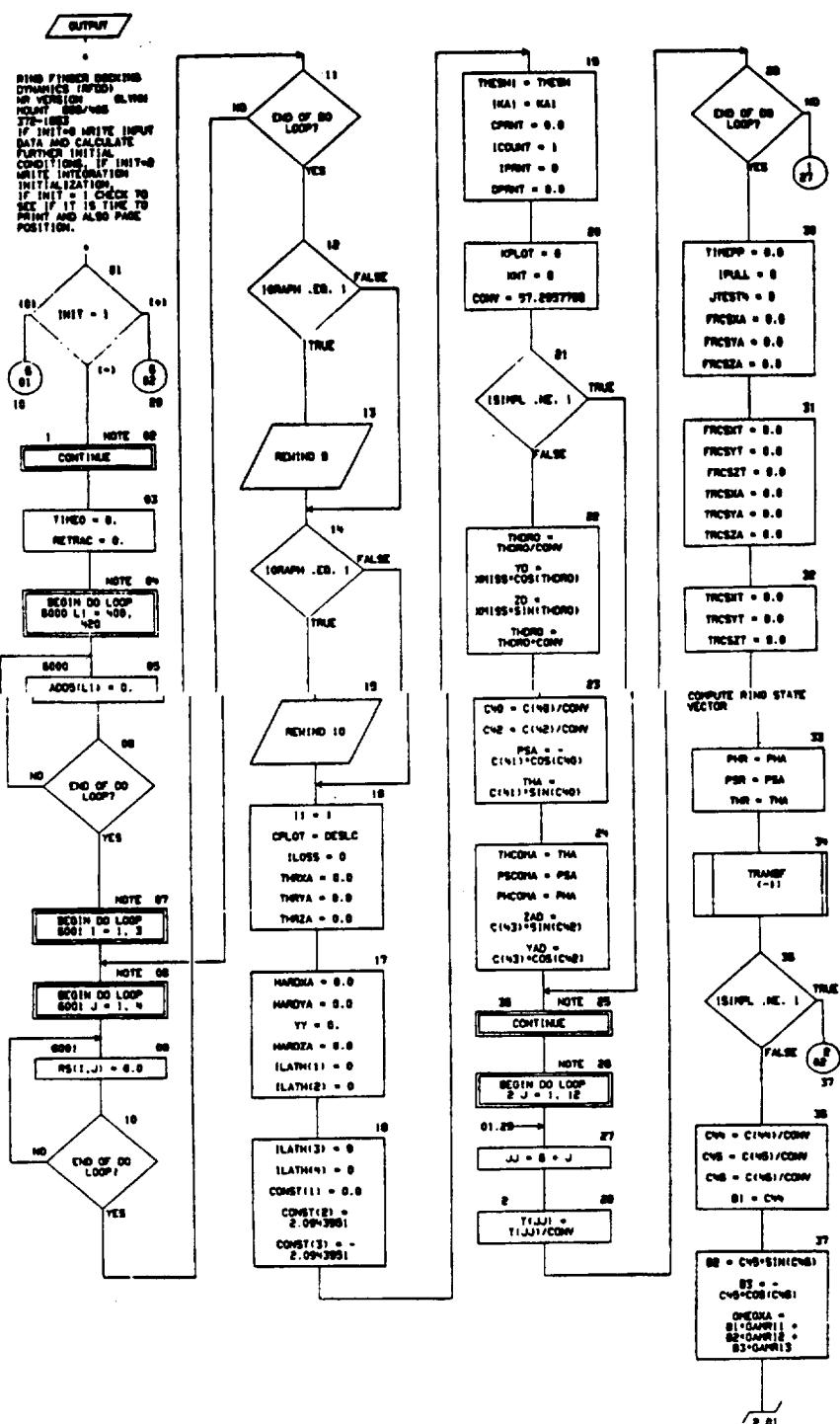
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**CHART TITLE - SUPPORTIVE OUTPUTS (M17)**



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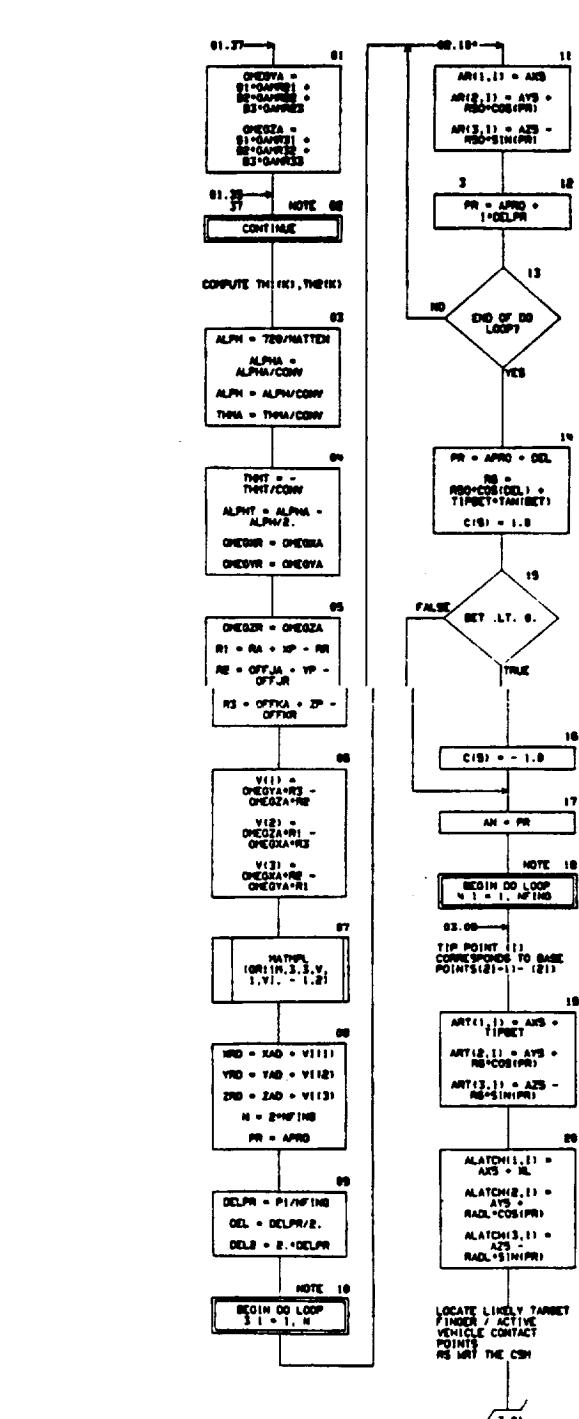
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SD 74-CS-0023





CHART TITLE - SUBROUTINE OUTPUT(UNIT)

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SD 74-CS-0023



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- 371 -

SD 74-CS-0023





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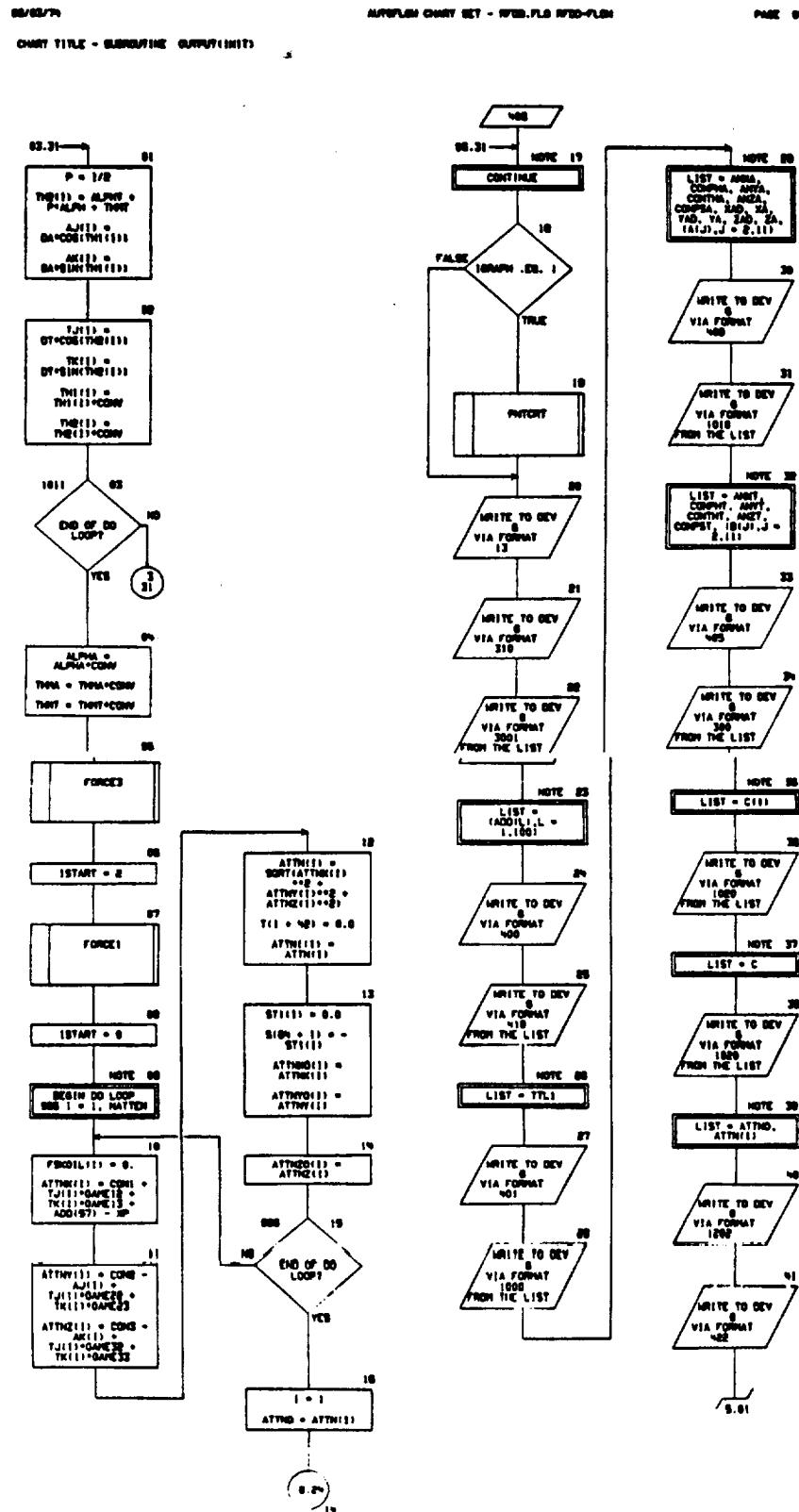
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- 373 -

POLAROID

SD 74-CS-0023



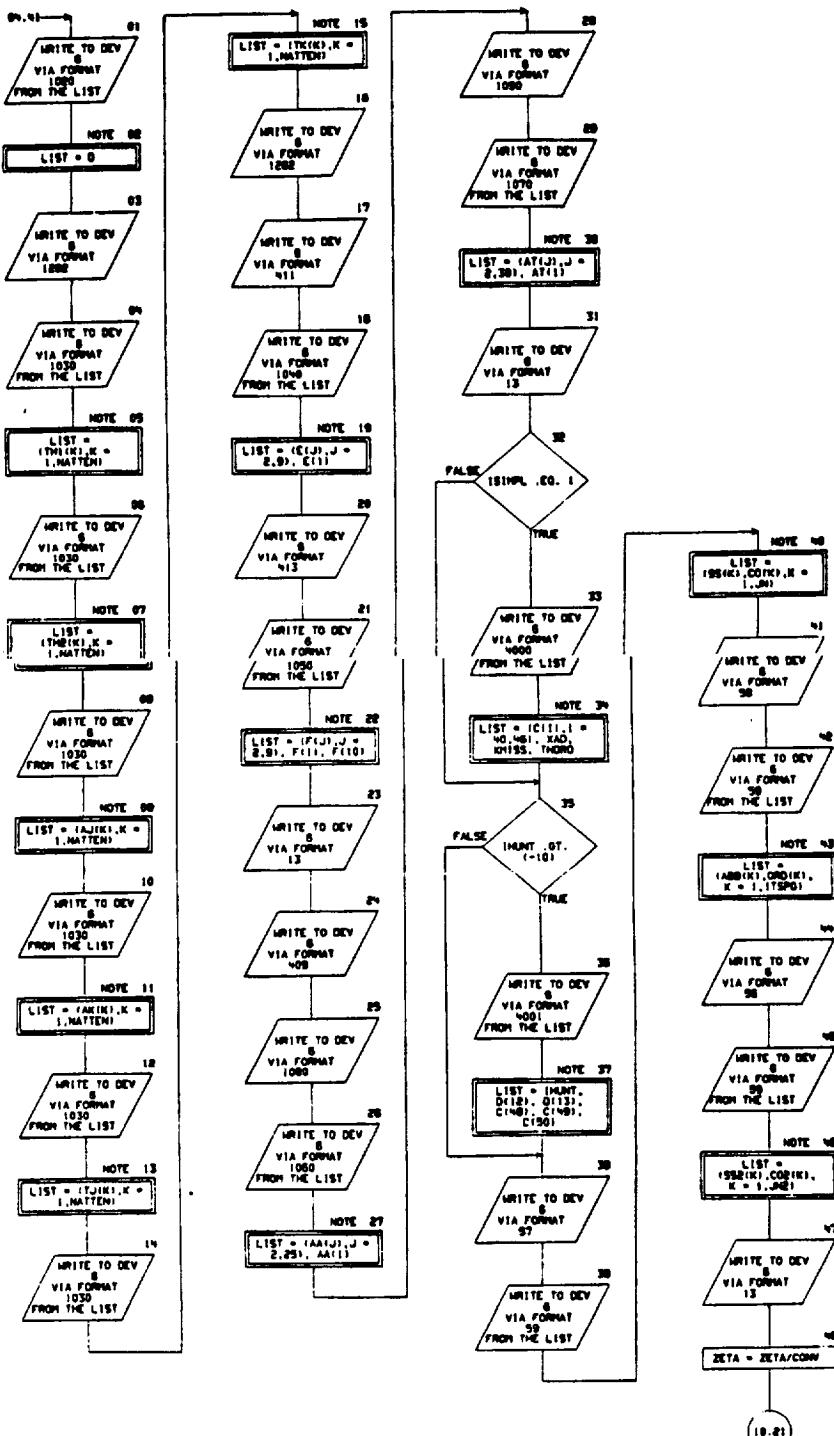


08/03/78

## AUTOFLOW CHART SET - AF00.FLO AF00-FLOW

PAGE 08

CHART TITLE - SUBROUTINE OUTPUT(UNIT)



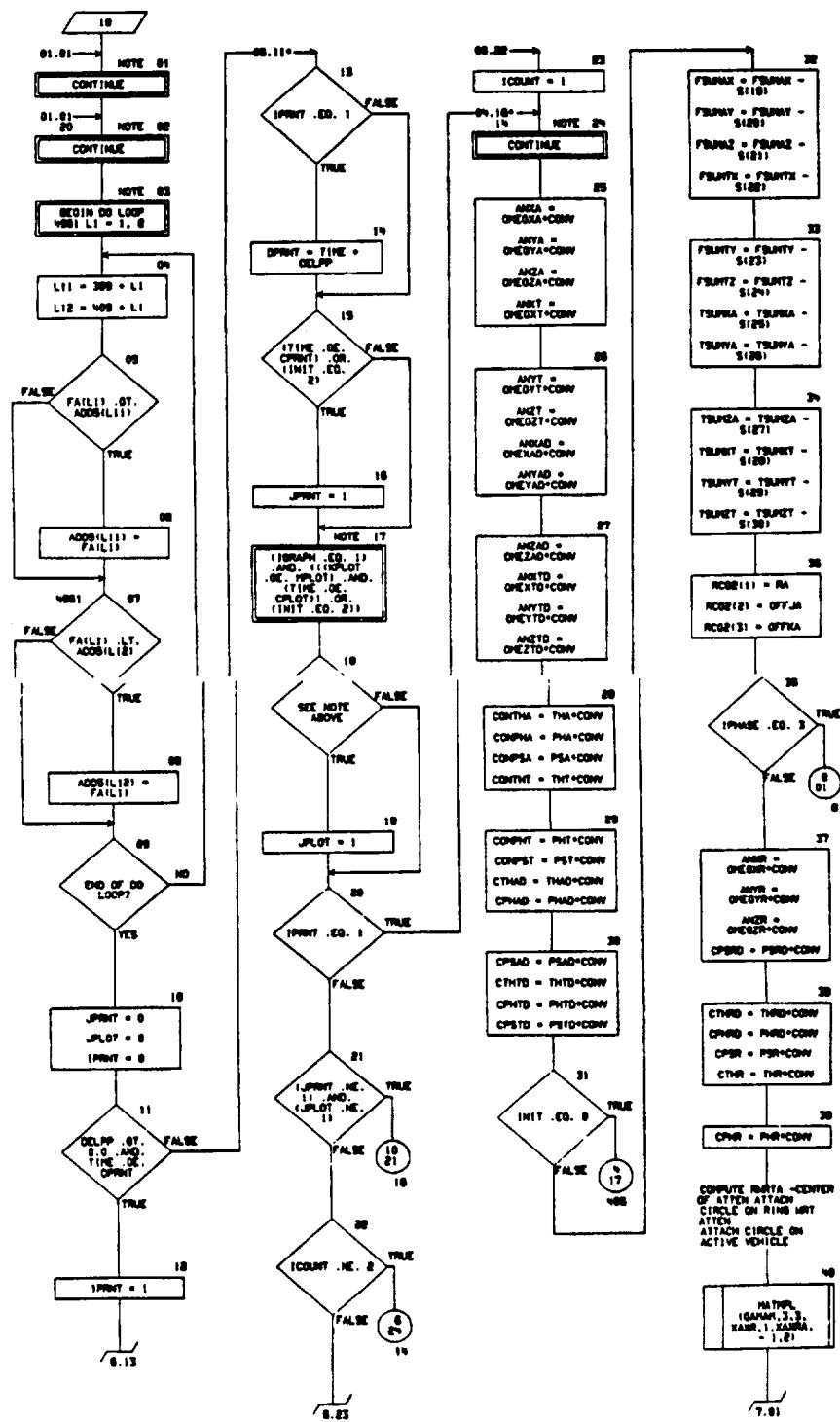
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- 375 -

SD 74-CS-0023



**CHART TITLE - SUBROUTINE OUTPUT (100 T)**



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- 377 -

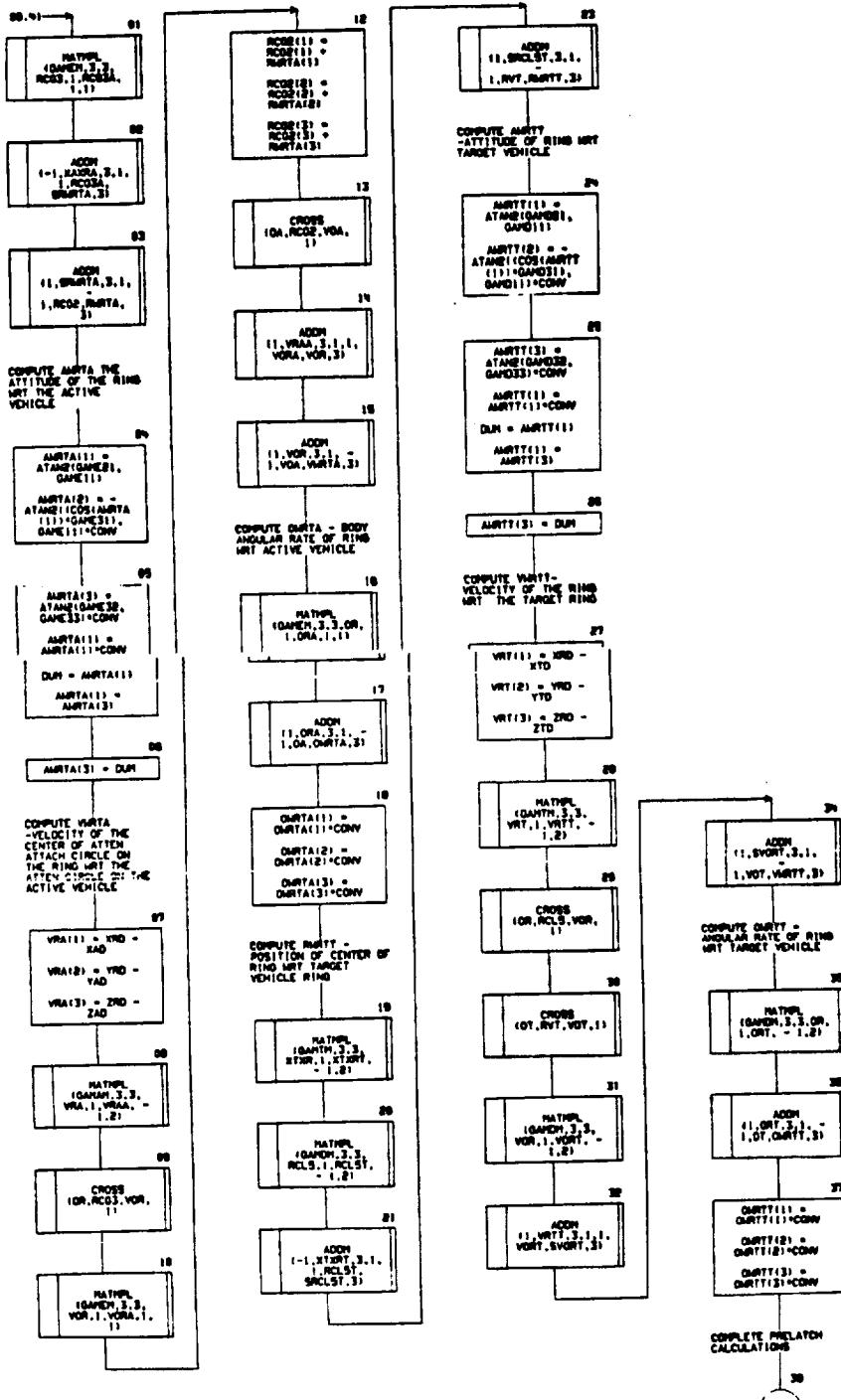
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CHART TITLE = THREHOLD TIME OUTPUT (ms)





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- 181 -

SD 74-CS-0023

**CHART TITLE - SUBROUTINE OUTPUT UNIT**

08/03/70

AUTOFLEX CHART SET - RPTD.FLG RPTD-FLEX

00.30 → NOTE 81  
CONTINUE

COMPUTE POSTCAPTURE  
1, THE FOLLOWING

01 AMR1 = AMR1  
AMR2 = AMR2  
AMR3 = AMR3  
CPTRD = CPTRD  
CTHR = CTHR

02 CPTRD = CPTRD  
CPTR = CPTR  
CTHR = CTHR  
CPTR = CPTR

03 FRY = 0  
FRY = 0  
FRZ = 0  
TRX = 0  
TRY = 0  
TRZ = 0

COMPUTE RUMTA - POST  
CAPTURE

04 XTA(1) = XT - XA  
XTA(2) = YT - YA  
XTA(3) = ZT - ZA  
RVTT(1) = RT - ANS

05 RVTT(2) =  
RVTT(2) = RT - JR -  
AT3  
RVTT(3) =  
RVTT(3) = RT - JR -  
AT3

06 MATPL,  
(GAMM, 3, 3,  
XTXA, 1, XTXAA,  
- 1,2)

07 MATPL,  
(BANN, 3, 3,  
RVTT, 1, RVTTAA,  
- 1,2)

08 ADDN  
(1, XTA(1), 3, 1,  
1, VTA, RUMTA,  
3)

09 ADDN  
(1, XTA(1), 3, 1,  
1, RVTT, RUMTA,  
3)

10 COMPUTE RUMTA - POST  
LATCH

11 XTA(1) = ATAN(GAMM, 3, 3,  
BANN, 1, BANNAA,  
- 1,2)

12 XTA(1) =  
ATAN((GAMM, 3, 3,  
BANN, 1, BANNAA,  
- 1,2) \* CONV)

13 XTA(1) = ATAN((GAMM, 3, 3,  
BANN, 1, BANNAA,  
- 1,2) \* CONV)  
XTA(1) = CONV  
XTA(1) = XTA(1)

14 XTA(1) = DUM

15 COMPUTE VTA - POST  
LATCH

16 VTA(1) = ZTO -  
XAO  
VTA(2) = YTO -  
YAO  
VTA(3) = ZTO -  
ZAO

17 MATPL,  
(GAMM, 3, 3,  
VTA, 1, VTA, -  
1,2)

18 CROSS  
(OT, RVTT, VOT, 1)

19 MATPL,  
(GAMM, 3, 3,  
VOT, 1, VOTAA, -  
1,2)

20 ADDN  
(1, VTA(1), 3, 1,  
1, VOT, VOTAA, 3)

21 ACCE(1) =  
ACCE(1) +  
RUMTA(1)  
ACCE(2) =  
ACCE(2) +  
RUMTA(2)  
ACCE(3) =  
ACCE(3) +  
RUMTA(3)

22 COMPUTE RUMTA - POST  
LATCHED

23 ADDN  
(1, VTA(1), 3, 1,  
1, VOT, VOTAA, 3)

24 MATPL,  
(GAMM, 3, 3,  
VOT, 1, VOTAA, -  
1,2)

25 ADDN  
(1, VTA(1), 3, 1,  
1, VOT, VOTAA, 3)

26 COMPUTE RUMTA  
(POST-LATCHED)

27 RUMTT(1) = 0.  
RUMTT(2) = 0.  
RUMTT(3) = 0.  
RUMTT(4) = 0.

28 RUMTT(1) = 0.  
RUMTT(3) = 0.  
VUMTT(1) = 0.  
VUMTT(2) = 0  
VUMTT(3) = 0

29 QUMTT(1) = 0.  
QUMTT(2) = 0.  
QUMTT(3) = 0

30 07.30 → NOTE 30  
CONTINUE

31 XTA(1) = XT - XA  
XTA(2) = YT - YA  
XTA(3) = ZT - ZA

32 MATPL,  
(GAMM, 3, 3,  
XTA, 1, XTXAA,  
- 1,2)

33 MATPL,  
(GAMM, 3, 3,  
XTA, 1, XTXAA,  
- 1,2)

34 NOTE 35  
BEGIN DO LOOP  
211 1 = 1, 3

35 NOTE 36  
BEGIN DO LOOP  
211 3 = 1, 3

36 NO → END OF DO LOOP  
YES → 37

37 R3A(1, J) =  
R3(1, J) +  
KTA(1, J)  
R3A(1, J)

38 NO → END OF DO LOOP  
YES → 39

39 NO → END OF DO LOOP  
YES → 40

40 TRANSFORM TO TARGET  
SYSTEM

41 MATPL,  
(GAMM, 3, 3,  
R3A, 1, R3T, 1, 2)

42 TRANSFORM TO FINGER  
SYSTEM

43 NOTE 41  
BEGIN DO LOOP  
212 1 = 1, 10

44 NO → END OF DO LOOP  
YES → 45

45 MATPL,  
(GAMM, 3, 3,  
R3T, 1, R3TT, 1, 2)

46 COMPUTE INTERFACE  
TORQUES - ACTIVE AND  
TARGET VEHICLES

47 CROSS  
(R3C, R3TT, VOA,  
1)



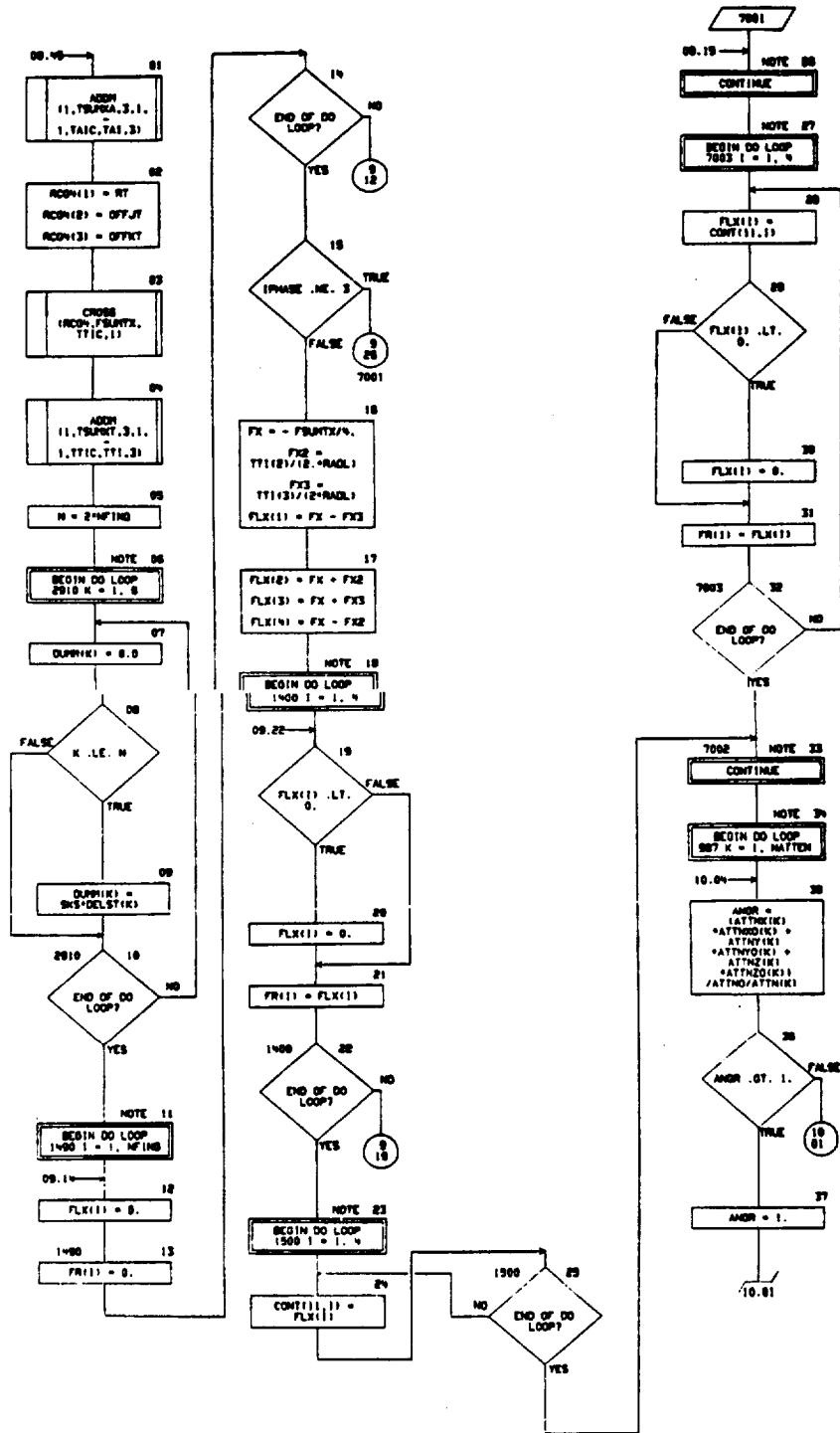


08/03/79

## AUTOFLOW CHART SET - PFD.FLG PFD-FLOW

PAGE 08

CHART TITLE - SUBROUTINE OUTPUT(UNIT)





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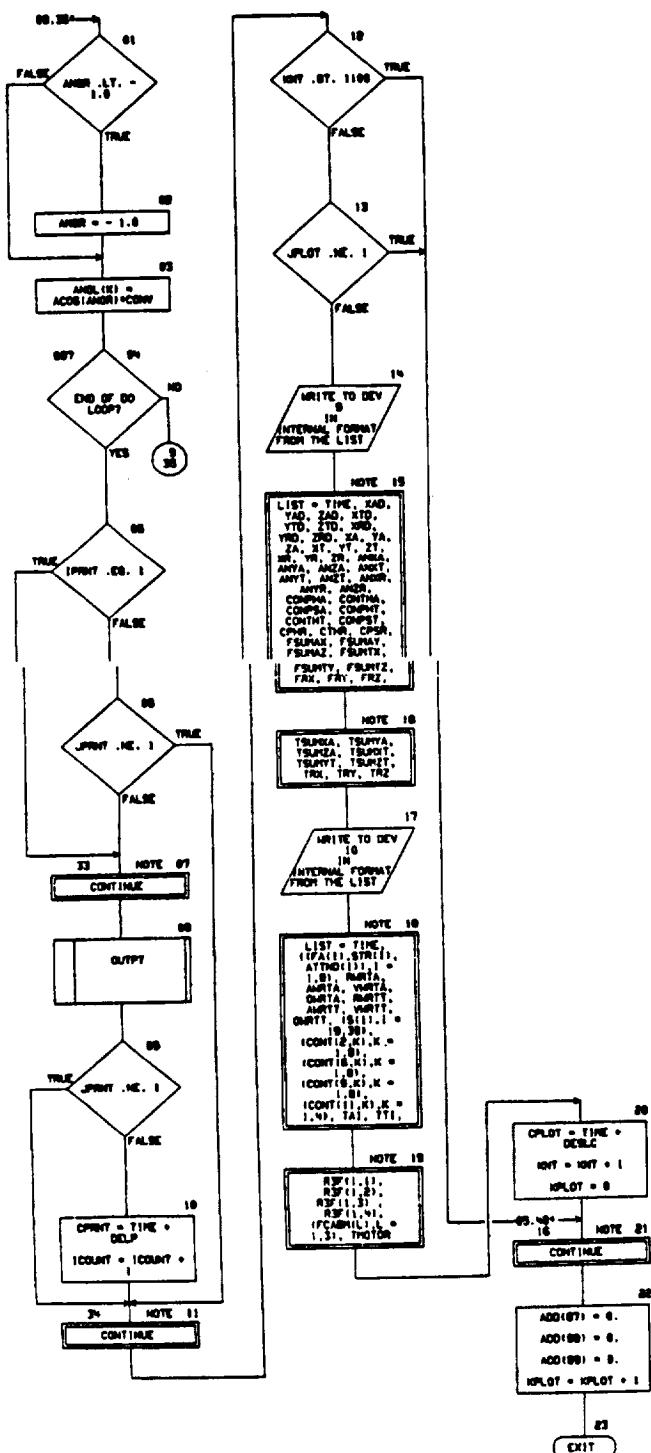




CHART TITLE = NON-PROCEDURAL STATEMENTS

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DIMENSION (LATM10),CONST(3)
,5(0000)
,ADD1001
DIMENSION ATTRX(20),ATTRY(20),ATTRE(20),ATTRB(20),STR(20),PAK(20)
,ATR(20),FAD(20),FA(20),AJ(20),AK(20),TJ(20),TK(20),TH(20)
,TM(20)
DIMENSION VAR(1600),T(8000),A(10),B(10),C(10),D(10),E(10),F(10),
A(10),B(10),C(10),D(10)
DIMENSION ATTR010(1),ATTR010(1),ATTR010(1),ANGL(1)
COMMON/TW/AR1,401,ART13,201
COMMON/LATCH/LATCH(3,4),CLATCH13,201
EQUIVALENCE(ADD1711),XL1,(ADD172),RDL1
DIMENSION ORI(10),B1,V(3),V(3)
,INIT(20)
EQUIVALENCE(ORI)(1,1),GR11
DIMENSION CONT(15,20)
EQUIVALENCE(ADD111,GR1),(ADD121,OFF,JR),(ADD131,OFF,KR)
,(ADD141,OFFL1),(ADD151,JO1R),(ADD161,YY1R),(ADD171,ZZ1R)
,(ADD181,OFFH1),(ADD191,APR1),(ADD131,AZ1),(ADD141,BET
1),(ADD151,TPE1),(ADD161,TPR1),(ADD171,CHOP)
,(ADD181,SK1)
,(ADD111,RS1),(ADD111,AS1),(ADD112,AVS)
,(ADD111,DISC),(ADD121,ISTRT)
EQUIVALENCE(T111,XA),(T121,YA),(T131,ZA),(T141,XT),(T151,YT),
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,(C1191,EXT1),(SLGP,C191)
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Rockwell International





#### LOCATIONS OF PRIMARY FUNCTIONS

The following is a list of primary functions and their locations in the program. Purpose of the list is to aid the user in locating possible modifications.

<u>Function</u>	<u>Subroutine</u>
Basic docking system geometry	FORCE 1, FORCE 3 OUTPUT
Attenuator hydraulics	SHOCK
Guide loads	FORCE 1
Attenuator forces	FORCE 1, FORCE
Ring loads	FORCE 1
Latch loads	FORCE 1, OUTPUT
Retract system equations	FORCE 3
Vehicle control systems	RCS
Basic equations or motion	MAIN, MASTER
Integration	MASTER, DERFUN
Graphs	GRAPH, PNTCRT
Print	OUTPUT, OUTPT

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